

MACMILLAN'S
TEACHING IN PRACTICE
FOR SENIORS

VOLUME FIVE

MACMILLAN'S TEACHING IN PRACTICE FOR SENIORS

AN ENCYCLOPAEDIA OF MODERN METHODS
OF TEACHING IN THE SENIOR SCHOOL
WRITTEN BY RECOGNISED AUTHORITIES
IN EDUCATION AND

EDITED BY

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Teaching in Practice for Infant Schools, etc.

*In Eight Volumes, with a Portfolio
of 150 Class Pictures*

VOLUME FIVE



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BEAUTY IN THE HOME

This series of illustrated talks, which begins on page 422, aims at helping teachers to train the aesthetic sense of children and to guide them in their appreciation of beautiful things to be found in the home. The talks will form the basis of a supplementary course of lessons in art for older children.

"S

PICTURE MAKING WITH A CAMERA

These talks, which begin on page 480, are mainly concerned with the pictorial aspect of the work, for it is in this branch that amateurs need the most help and guidance. The article will be found invaluable to those teachers who wish to run a school Camera Club.

PRINCIPAL CONTENTS OF THE EIGHT VOLUMES

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The Teaching of English Literature and Composition; Some Notable Authors; The Teaching of Poetry illustrated by some forty poems by modern poets; Some Notable Poets; Speech Education; Senior School Drama; Speeches for Notable Occasions; Some Notable Orators.

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VOLUME III

Art and Craft.—The Teaching of Book-crafts; Sketching Out of Doors; The Making of Presents in Needlework; The Teaching of Woodwork.

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The Teaching of British History; The History of British Costume; Ancient History and Helps to Bible Teaching; Common Law for the Home and School; The Teaching of Civics; Notes on the History of Ancient Greece, Ancient Rome, China, Japan and India.

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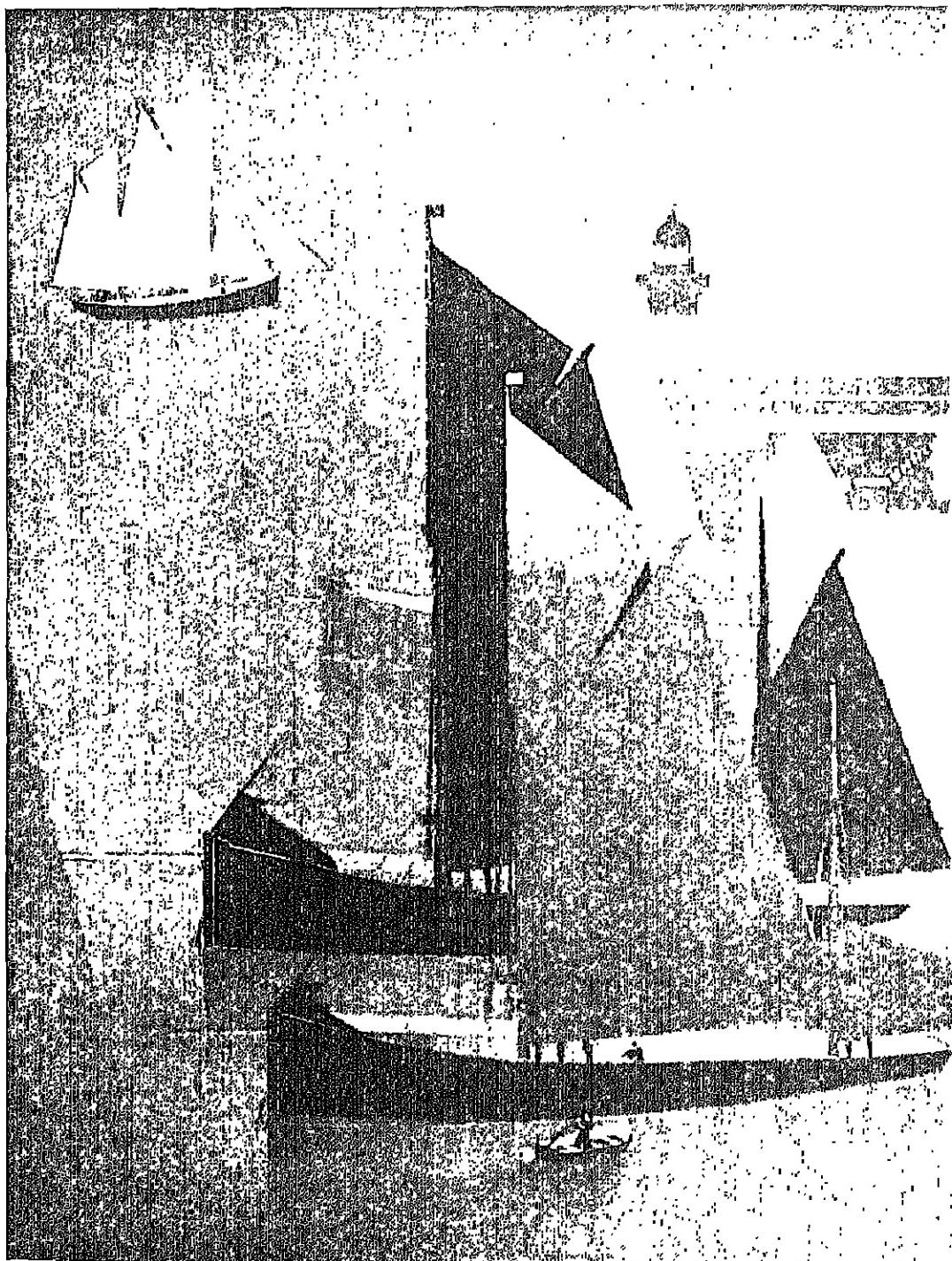
Time-tables; The Teaching of Mathematics; The Treatment of the Backward Child; The Leavers' Class and Vocational Guidance; Getting a First Job; School Clubs and Societies; The House and Team System; The School Camp and London Journey.

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THE TEACHING OF ART IN
SENIOR SCHOOLS



From a colour woodcut

[Reproduced by courtesy of John Potts, A.R.C.A., F.S.A.M., of London]

SAILS

INTRODUCTION

The function of art in the school. During the last twenty years there has taken place an almost complete change of conception of the function performed by work in art in school life. Recognition has been won for its direct bearing upon the crafts in the form of pattern, colour and generally applied design. Some attempt has been made to apply these features in relation to the simpler laws of proportion, with varying success depending upon the knowledge or inherent good taste possessed by the teacher. But it is unfortunate that there has been no corresponding growth of perception as to the rightful place of art—using the term in its widest sense—as a purely cultural part of the whole curriculum of the senior school.

Aims. The chief obstacle in this respect has been the vagueness of aim which has characterised all art teaching in schools generally, and the chaotic state of this subject is evident in most schools even at the present day. Some treat it as a purely formal and "disciplinary" activity, following a rigid scheme which consists mainly of the drawing of common objects to a high degree of accuracy and finish, with other lessons on "ruler drawing" of a semi-technical kind. Others concentrate almost entirely upon the application of pattern to the crafts. Many schools treat the subject in a most haphazard manner, taking whatever comes to hand, day by day, as being suitable for the drawing lesson, with no thought of progression and with no definite aim whatsoever. Still others have gone wholeheartedly but unthinkingly from the rigid scheme to the opposite extreme, attempting nothing but "expression" work and achieving nothing but partial success within very narrow limits.

There are, of course, a number of schools in which the problem has been thought out and in which a truly progressive scheme of

work is in progress. In most of these schools a specialist teacher is in charge of the work, one whose training and qualifications enable him, or her, to judge the value of every part of the course.

It is this very problem of selection which confronts the average non-specialist teacher, causing tentative experiments to be made in the various media. Problems of technique then arise, followed very often by obvious failure until, finally, refuge is taken on the sure foundation of "object drawing." The whole subject is so vast in its possibilities that no definite course can be chosen unless a very definite aim is kept in mind.

This aim, it is suggested, should be wholly cultural. Even in cases where a local industry exerts its rightful influence upon the trend of the work done, as for instance the screen- and block-printed fabrics of Lancashire, the utilitarian basis of the scheme is used to promote that awareness of the qualities of good colour and design which forms so large a part of the cultural aim.

Such an aim includes some genuine appreciation of good arrangement, either pictorial or decorative; of good colour, and of beauty of line and form. It is truly educational in the width of its application not only to pictorial work but to every branch of fine and applied art. And it is here that it joins hands with the aim of the craft teaching in appreciation of fine craftsmanship and its place in a complete, decorative scheme.

Methods. Once the aim is clear, it is possible to determine the means of approach. Draughtsmanship, it has been said, is the basis of all art, which is an undeniable truth. But draughtsmanship does not mean merely the power to represent an object as being bounded by a black line, on a background of white paper. It means the ability to draw; to express an idea; a sensation or a feeling

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of something which may be quite intangible; a new conception of an everyday fact, or a pure abstraction, in addition to the ordinary representation of what is seen by the observer. And if we accept the acquisition of a certain standard of "good taste"—a high form of culture—as the major portion of the aim in view, it will be expressed through draughtsmanship in the form of suitable furniture, soft furnishings, pictures, books, and interior and exterior decoration, in however simple a manner.

Probably very few of the children will become professional draughtsmen, architects or commercial artists, and we are not concerned with the training for these professions; but unless some practical basis such as that mentioned above underlies the scheme of work it will be valueless from the educational point of view. Culture is not merely a state of mind to be achieved by mental processes alone. It needs some material form through which to express itself, whether it be music, literature, or any other of the arts.

If, then, we concentrate upon the narrowest form of draughtsmanship alone, that of ability to represent an object faithfully, it will be impossible to realise the aim that we have in mind. Training of the powers of observation—the great argument advanced in favour of object drawing—will be directed only upon isolated objects, irrespective of their surroundings. The imaginative powers will be almost entirely neglected, and memory work, upon which most of the imaginative drawing and design is based, will be so restricted in scope as to be of very little value, so that the pictorial work becomes merely an attempt at photographic reproduction which is devoid of individuality.

On the other hand, if we neglect the draughtsmanship altogether, and so ignore the scaffolding upon which the children should build up their creative efforts, nothing is left but the sketchy attempts which have no solid foundation. These likewise will achieve nothing of value in themselves, and it is this fact which has led to the total

misunderstanding of the purpose of "expression drawing."

Obviously, therefore, the only method that can be recommended is the selection of the best points of *both* types of drawing, and their fusion into a progressive course that will extend from the junior classes indefinitely, or according to the total time allotted to the subject. Each stage of the course should build on from the preceding one to the next stage so that the children are steadily absorbing new ideas and applying them with increasing confidence to fresh discoveries. In this way the interest is sustained along with the standard of work that is obtained, and progress will be both rapid and successful.

The children. Young children especially are keenly interested in everything that is going on around them. The life, colour and movement of the streets, their home-life and surroundings, in average circumstances; the playing fields, the cinema, and the country or seaside holiday, animal life, motor cars, aeroplanes and ships of all kinds, and bright and cheerful colours; all these are the things which young children delight in drawing. And if these and similar subjects are used as the basis whereby a sound progressive course of training in drawing is given, the children will come eagerly into the art room for every lesson. The dismal atmosphere of almost certain failure which has accompanied the average drawing lesson will be exchanged for one of expectant interest.

The children should be encouraged to make sketches and detailed drawings of all kinds in out-of-school hours, not as a homework but in the form of a sketchbook. All the material thus gathered may be used when difficulties arise in the imaginative work. Such drawings, also, may be incorporated in many of the more formal lessons, and this practice will avoid the need for slavish copying from other pictures, a method which is strongly to be deprecated. Furthermore, the children will feel that they really are

doing something worth while and that they are making definite progress, while the advantage to the teacher is that such work keeps the children in constant practice during the long intervals between lessons.

Finally, it is as well to consider the effect upon the contact which should exist between the school and the home. Neither parents nor children are interested in a pile of mettulously shaded drawings of buckets, mops, cubes and pyramids. But if a good drawing or painting of either a pictorial or a decorative subject is taken home, it is worth framing and becomes a source of interest at once. It may even have a good influence, in common with other work in art and crafts, upon its immediate surroundings. The writer has even heard of remarks being made, in similar circumstances, indicating that the ratepayer felt that, at last, he was "getting something for his money."

The teacher. The first essential is that the teacher should be an enthusiast. From the teacher's point of view there is probably no subject in the whole curriculum which can be so dull and uninteresting as drawing when all enthusiasm is lacking. But of greater importance is the effect of this attitude upon the children. They are aware at once of any such feeling on the part of the teacher, and their work will at once reflect it by its lifelessness and lack of progress.

Almost as bad is the "What shall we do to-day?" attitude, to which is due much of the haphazard, scrappy and valueless work that is seen in the school which does not possess a definite scheme in drawing. The spray of beech leaves, followed the next week by an attaché case, then by two tomatoes on a cabbage leaf, and then by a felt hat all treated in exactly the same manner is a method which is bound to fail. Only the very gifted children can cope with the variety of textures and other problems which these haphazard exercises present to them. The others in the class are dispirited by the lack of variety in treatment and by the certainty of failure in their draw-

ings. In every case the single, isolated object may be a good drawing exercise but its art value is negative as it is unrelated to any background or other object.

This mistake is due generally to lack of knowledge on the part of the teacher, who may be a "general practitioner" without special training in the teaching of art. But lack of specialised knowledge is not so great a drawback as an unsatisfactory mental attitude to the work, for there are various means for acquiring skill and efficiency in the teaching of drawing sufficient for the purposes of the senior school. Courses are provided by summer schools, and others—some of which are helpful—are provided by correspondence, but the finest course of all may be provided by the teacher himself; for he should draw at every possible opportunity. Blackboard sketching in any subject is one of the finest means of training oneself to draw, whilst good reference books will clear up many of the mysteries of colour, harmony, perspective, lettering and the use of pattern, etc.

Subject.—The importance of a right approach to the subject has already been touched upon, but the twin aims of cultivation of the aesthetic emotions and the sense of "good taste," along with an appreciation and understanding of beauty of line, form and colour, should not blind the teacher to the corresponding importance of a correct beginning.

The art course begins in the infant and junior school, and not in the senior school. It is impossible to start in the middle, as it were, and if a suitable groundwork has not already been covered in the junior school, as much of that work as possible will have to be done before any further progress is possible.

For this reason a short summary of the purpose of the junior school course is given at the beginning of this senior school scheme, for without some understanding of the importance and significance of the early "expression" drawing a great deal of the

value will be missed from the senior school course. Without it, the most essential and most truly artistic aspects of the course will be heavily handicapped to the point of failure for reasons which are stated later. It may be remarked here, however, that an art course which is compelled to omit illustration work—in the wider sense of the term—from its scope will inevitably be reduced to the uninspiring representation of objects and to similar exercises in a meaningless succession without aims and without any direct application. What is much worse than this, the possibilities inherent in the children will not merely lie dormant but will be stifled to the extent of being lost for ever.

Syllabus.—In addition to the influence that is exerted upon the formation of the syllabus by the aims of the course, it is of first importance to consider the time that is to be allotted to the subject, for each lesson and for each week, term and year. If one branch of the work is pursued indefinitely, it will suffer sooner or later by losing contact with other equally important branches. If a definite time limit is set for the whole course, this should be mapped out to give fair representation to all the essential branches.

In general, something has to go, for it is impossible to deal with a fully comprehensive art course in the severely limited time at the disposal of the senior school. For this reason the scheme should be "fluid" in the sense that the most urgent section of the work should be dealt with as its need arises, irrespective of the day of the week or of its original place in the detailed scheme. Some branches may have to be omitted altogether, and it is suggested that those which may be dispensed with are the painting of flowers and other objects, or groups of objects, in water colour, owing to the many technical difficulties existing in this type of work, such as composition and balance, super-imposition of washes, tone values, quality of hues in light and shade,

and cast shadow, etc., without an understanding of which the result can never be anything more than mediocre.

For similar reasons it is advisable to select the media to be used with a view to assisting the particular branches that are likely to be included, and not to order them indiscriminately. For instance, in ordering water colours, it will be found that it is necessary for the course suggested here to restrict the quantity of ordinary water colours in tubes, or half-pans, and to expand the order for tins of tempera and powder colours. Similarly, much of the time spent on colour work may be saved, to great advantage in accuracy of results, if coloured papers are used for the "colour theory" exercises instead of ordinary water colours. In the scheme outlined it will be seen that these papers are used even for the most advanced work, as they are quite satisfactory for all purposes within the limits of the school syllabus. There are certain objections to the use of these papers, notably that they restrict individual experiment by compelling children to work within a limited range of hues, tints and shades, but as that very principle is one which is strongly recommended for the beginner by many of our foremost artists, including Frank Brangwyn himself, it is extremely unlikely that any permanent damage will be done to the artistic development of our children by its adoption in the school. What might be lost in this way is more than compensated for by the avoidance of chaos in the colour exercises at the beginning of that section of the course, with the consequent saving of time and certainty of instruction.

Although the syllabus should be detailed and definite in order that a progressive course may be followed, it is always subject to revision at any particular stage. So many things in a school besides the children are variable quantities that there is bound to be some need for changes. Then again, fresh ideas are always occurring to a keen teacher which require experiment before being incorporated within the scheme, or being dropped

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as unsuitable for further use. New methods—inevitably old ones in a fresh guise—are always being advertised, and as such they should receive due consideration. In short, a subject that is so essentially alive and creative as the school art should be must have a fluid and elastic syllabus. Facts remain as facts, even in art, but their mode of expression is infinite in its variety.

The art room.—Comparatively few senior schools possess a properly equipped art room. In most cases where some attempt has been made to provide special facilities, a room known as the "crafts" room or the "special subjects" room is set aside for the teaching of art and crafts, but many schools are compelled to use the ordinary classroom.

It is most disheartening to have to attempt to teach these subjects in a room of this type, for in any case the work is sufficiently difficult to handle without the added disadvantages of totally unsuitable desks and seating arrangements; lack of water and gas; lack of good lighting and cupboard space, and the need for hurriedly getting out, and clearing away, all the materials and equipment for every lesson. Another essential that is usually missing is a really good, large blackboard.

Some of these difficulties may be overcome in the ordinary classroom. Trestle folding tables are useful for the craftwork lessons as well as for the art work which needs plenty of elbow room. When they are not in use they may be stacked away without too much inconvenience. Sheets of millboard or strawboard may be used in lieu of drawing boards, and the paper may be attached to these by paper clips, in preference to drawing pins. The probable lack of a gas ring in the room may be compensated for by the use of a small oil heater of the "Valor" type for the gluepot or other necessities. This type of heater is safer to use than the Primus stove and has the advantage of being quite silent in operation. The water difficulty cannot very easily be overcome, but a few 2 lb. jam jars (which

are not easily overturned) standing in an ordinary, galvanised iron hand-bath will save a number of possibly long journeys to the nearest tap.

If it is possible to add to the fixed fittings in the room, the most valuable addition will be a long wall bench with a flat top 2 ft. wide and with cupboards built in underneath. At one end of this wall bench a built-in sink may be fitted, alongside which the bench top may be covered with a sheet of zinc for a distance of, say, 4 ft. On this metal top the glue-heater may be placed, and it will be large enough to carry out safely any dyeing or other work which cannot very well be done on the tables or desks. The cupboards underneath will hold the folios of the various groups or classes which use the room, and they will also provide a storage place for all the odds and ends of equipment which are needed in a hurry and for which there may not be room in the ordinary stock cupboard.

Good lighting is very important and in a classroom of the old type in which the lighting is bad it may be rectified—if the circuit will stand the load—by fitting three-way holders (in clusters; i.e., three lamp-holders to each lighting point) and enclosing each cluster within a large, vertically sided lampshade made of parchment paper and covered across the top. These shades will throw the light downwards and concentrate it over the tables.

Next, the appearance of the art room is of similar importance. Nothing is less inspiring than the sight of a long series of dirty and dog-eared pieces of paper—comprising the class's efforts during the last few lessons—pinned up on every available section of woodwork round the walls of the room. Similarly, rows of dusty and badly hung pictures (usually of every subject under the sun, but nearly always including *Napoleon at Waterloo* and *The Boyhood of Raleigh*) become positively nauseating after a while, although they are seldom looked at by the children as after a time they become part of the furniture of the room. There is a

curious and long-surviving myth to the effect that such pictures are of intense interest to children, whereas actually children at the present day are not enamoured of purely "subject" pictures; and this is very much the case when the style of painting and the composition and technique of the picture is entirely "above their heads."

The best way to arouse the interest of the children in good pictures is to cover one portion of the classroom wall with large sheets of Upson or Beaver board and to mount one good reproduction on this background for a week or so. At the end of this period the picture should be replaced by one of a different type. If it is possible to do so, several sketches and colour notes of the main composition and colour scheme of the picture should be arranged neatly towards the bottom edge of the whole panel, so that the children may study these aspects of the exhibit at their leisure and may make notes of these points for themselves. Such notes may be executed in the first place by chosen pupils from a senior group, and this method will be found to assist materially in the teaching of these aspects of the work. Time is saved, the interest of the children is ensured and maintained and they are made to feel that they really are relating their work to that of the accomplished artist. Good examples of commercial art are of the greatest value in such presentation, as the technique of the poster designer is strong and clearly defined and is not submerged in detail. Many of the posters exhibited by the railway companies (which may be purchased at special rates for schools) are excellent for this purpose. Posters, thus, may be alternated with examples of purely pictorial art, and if it is impossible to obtain these owing to their cost there are many good things to be had from the covers of such periodicals as *Good Housekeeping*.

The case against the drawing book.—This is best stated briefly as follows:

1. The drawing book compels the child to work under the ever-present fear of

"spoiling the page," thereby restricting his freedom in drawing and preventing him from going "all out" in experimental work.

2. The drawing book is costly. This criticism applies particularly to the interleaved pastel-paper book.

3. The size of the page is too small.

4. The book is awkward and clumsy in use.

5. It compels the child always to work on the same quality and texture of paper, irrespective of the work in hand.

All these disadvantages are obviated by the use of separate sheets of paper. For all the rougher experimental sketches, illustration work and early colour work, a cheap, thin paper is obtainable which serves these purposes admirably. If a sheet is spoiled it can be thrown away without any considerable loss to anyone, whereas if a page in the book should be spoiled it remains as a permanent and discouraging record to be held against the child in his own mind, and predisposing him to lack of confidence in himself.

The more expensive cartridge paper of which the books are composed may be kept for certain branches of the work such as nature drawing in line and wash, or line alone, and certain forms of object drawing, lettering, etc.

Loose sheets may be larger than those available at a reasonable price in the books, and they may be used on the drawing board or on the strawboard substitute with greater ease than is possible in the case of the book page. This freedom of movement and freedom from worry combined with the larger drawing that it allows ensures a training of greater artistic value than can otherwise be attained. The argument of lack of neatness in the preservation of drawings fails, as a folio which will take all such loose sheets can be made quite easily in the craft lessons. Loose sheets of pastel paper may be used for the appropriate media of pastels, crayons, coloured pencils, charcoal or body colour, and they may be kept within a separate folder.

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The smoothly dressed surface of the special lettering paper which may be obtained for manuscript work will thus become available for use in the same way. Other papers may be experimented with for various treatments and effects, including those with absorbent qualities which make them most suitable for lino-block printing in the Japanese manner, which makes use of ordinary water colours.

Finally, the children get a very definite relief from the "notebook" appearance of the drawing book, and the use of sheets of paper places them at once in tune with the "feel" of the work that they are endeavouring to accomplish. It is not always necessary to requisition specially prepared papers, for the back of the ordinary roll of wall paper has a surface texture that is excellent for drawing upon in soft pencil, pastel, charcoal and even water-colour, and the varieties which are tinted "biscuit" or grey provide an equally excellent "toning" background upon which to work.

Materials and substitutes.—On grounds of economy it often becomes necessary to make use of cheaper substitutes in place of the more expensive media and materials. Wall-paper, as mentioned above, makes an excellent substitute for many purposes, and large supplies may be had at times from shops and builders' yards in the form of "remainders" and short lengths left over from jobs already finished. Then again, the cheaper distempers and wall paints, as well as the ordinary oil paints, make good substitutes for the more expensive water colours, oils and poster colours to which the small school cannot aspire, being rated on a per head basis for their allowance. Some really fine and permanent work has been done in ordinary and "washable" distempers on builder's plywood or on Beaver and similar prepared boards and even on ordinary cardboard and strawboard. The latter, if sized with thin Scotch glue, makes an excellent surface for oil painting as the sized and slightly rough texture gives a pleasant "bite" or tooth for the brush

strokes. However, oil painting is seldom attempted in the senior school, whereas painting in body colour (poster colour) is common, both for posters themselves and for decorative panels of all kinds. For this work, also, strawboard and cardboard make an excellent substitute for the prepared boards sold for the purpose.

Architect's "detail" paper sold cheaply by the roll, and typewriting and duplicating papers, are suitable for many purposes in lieu of more expensive varieties. The one thing upon which it does not pay to economise is the painting brush, for good work is impossible if the brush has no character or shape and will not retain its shape in use. The money saved by the use of substitutes for other materials should be invested in the purchase of reliable brushes even if it means doing without something else.

Substitutes in plenty may be found for the expensive china palettes, which are always being broken and which are always too small. Woolworth's stores are a great boon to the discerning buyer of substitutes for artists' materials and equipment, but they do not appear on the list of contractors from whom these things may be requisitioned. The ordinary domestic saucer makes a good palette for many school purposes, whilst tin lids and cream jars have their immediate uses in the art rooms.

Another expensive item which may be dispensed with, if need arises, is the japanned tin colour-box. Half-pans of water colours are excellent for the purposes of the serious student of painting, but when they are used in school they invariably become either hard and useless, through lack of care and long periods of disuse, or they are rendered so dirty by careless intermixing of colours that it becomes impossible to produce a clean wash of the original hue. It is much better to order the tubes of colour, for these may be kept for a long time and may be issued to the children in a state of unspoiled freshness. Furthermore, the children should never be encouraged to bring to school those enormous

boxes of cheap water colours which well-meaning people persist in presenting to them at birthdays and Christmas time. To attempt to instil an elementary colour sense into a child possessing a colour-box with every conceivable (and inconceivable) tint, hue and shade of purple—a most dangerous hue—is to attempt the hopeless. A child may ride a tricycle, but he would not be allowed to attempt to drive a car; in the same way, he may learn a great deal by experimenting with a few good colours, and cannot go far wrong, whereas with the whole orchestration of colour he will be completely lost from the start.

Formal colour teaching.—For the reasons already mentioned it is advisable that the children should have some formal instruction in colour work. Without it the average child can make but little progress, but only the essentials of simple colour recognition and arrangement should be taught in this manner. The extent of this stage of the work is shown on Class Picture No. 133 dealing with simple colour schemes, and further details are given in the lesson notes.

Memory work.—This should be continued throughout the course, for it is of the greatest importance. In fostering imagination, originality and the power to visualise, this type of drawing is pre-eminent in its value, and it should provide the raw material upon which to build the formal side of the instruction.

Memory drawing does not consist of covering up an object for a few minutes while the children draw from their recent observation. That is one form of application only, for memory drawing begins in the infant school and continues to the end of the senior school, changing its form as the work proceeds. For instance, the early "expression" drawing is a collection of memory drawings assembled, haphazardly, on a sheet of paper. The next step, taken in the transition stage between junior and senior school work (which is bound to overlap, to a certain degree), is to give greater prominence to

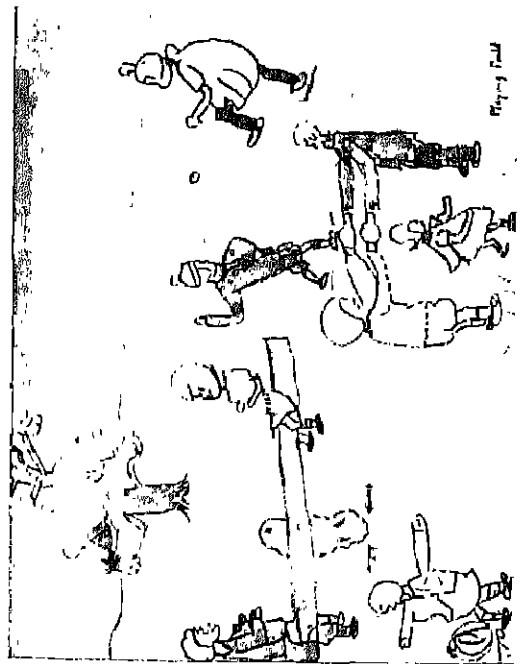
the important parts of the drawing as a whole (the first lessons in composition, without technical terms). Then in conjunction with the early teaching of colour comes the simplification of memory drawings and their definite arrangement within the bounding lines of a rectangle (further lessons in composition, with the first lessons in colour balance and tone values). Finally, towards the end of the senior school course, the memory drawings are carefully planned for direct application as book illustrations, posters, show cards, book jackets, linocards, designs for other craft projects, and any other demands that may arise.

In this way it will be seen that the whole course, in every part, aims at final cohesion and direct application to a definite purpose. It is only by planning the scheme with this aim in view that real progression can be obtained, and this is assisted by the quick recognition given by the children to the fact that every step that they take in their art work is leading on to a definite end.

Reference library.—In addition to the periodic exhibition of good reproductions of pictorial subjects, posters, etc., already mentioned, a series of folders should be available to the children for purposes of study and assistance in their individual work. These folders might contain cuttings from all kinds of periodicals, and also photographs, filed under such labels as *Trees*, *Animals*, *The Seaside*, *Ships*, and so on.

There are many things which no child can be expected to draw from memory with any degree of accuracy. It is not suggested that these details should be copied from such a reference file but that the children should be allowed to use the files provided that they transpose the original subject into a purely decorative treatment and include the result as one item only in an original composition. If a pictorial treatment is necessary, then the original subject should be treated in a different manner. In this way the children may obtain the full value of individual study with assistance in their difficulties but with-

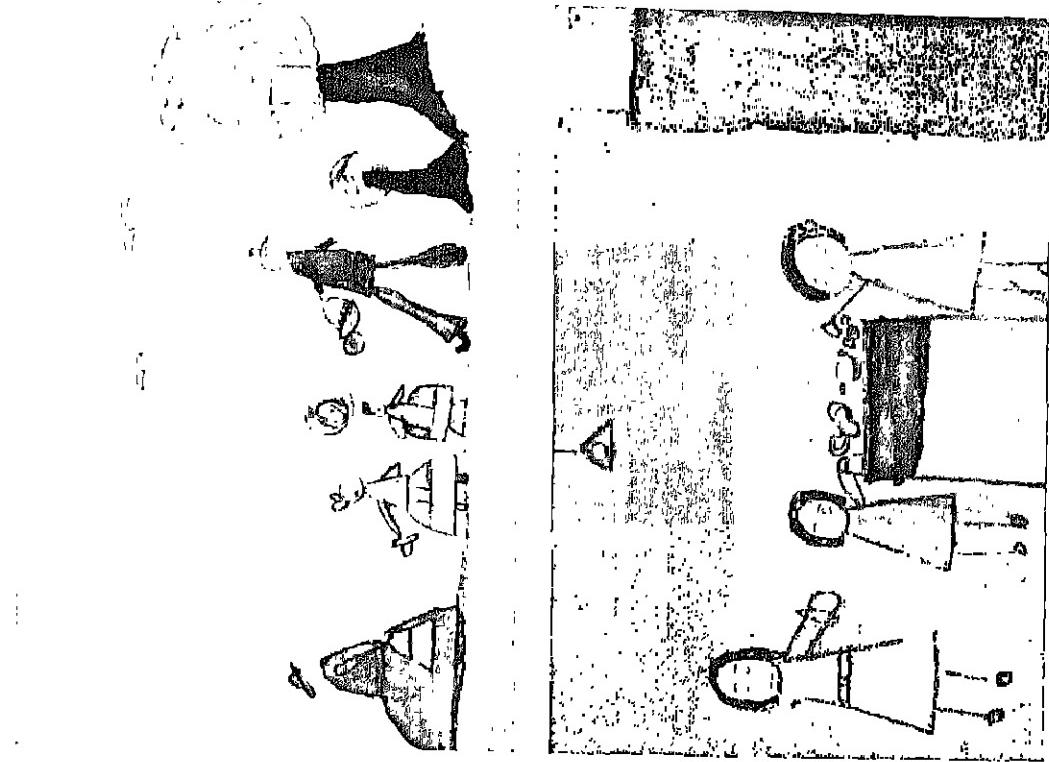
PLATE I
IMAGINATIVE DRAWINGS BY CHILDREN AGED 6 TO 8 YEARS



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II



out the need for slavish copying which would destroy their developing powers of expression.

There are a number of useful textbooks on the various branches of drawing and painting, some of which are suitable for senior school use and which might be kept by the teacher on a particular shelf, to be issued for immediate use in the art room. Such books might be requisitioned, but the material for the reference files can be obtained through the efforts of all the children in the school. The examples that they bring should be weeded out, as many of them will be unsuitable or in bad taste, especially the coloured ones, among which the teacher will probably find a large proportion of highly coloured desert scenes, complete with Arabs, camels, pyramids and astonishing sunsets.

Art clubs.—Probably the most effective stimulus to the art work of the children is provided by the annual exhibition of the Sketch Club. This activity should be run by the children themselves, who should appoint their own committee for the selection and hanging of the work to be accepted for exhibition. This procedure enables a standard to be set and maintained, and the teacher is called upon to

act only in an advisory capacity. The "show" may coincide with the school's "Open Day," but if possible it should be retained for several days as it will provide much useful material for class criticism of a helpful and constructive nature. All work should be mounted with careful attention to marginal spacing.

Criticism.--The function of the teacher throughout the course should be that of the kindly critic, leading the children on from one achievement to the next, suggesting and advising at every stage but not drilling them in processes which appear to them to be meaningless. The purpose of every step taken should be explained to the children and they should be encouraged to profit by their (frequent) failures and not to regard them in detail, as insurmountable obstacles. Criticism is constantly necessary, but it should be constructive, kindly and helpful, and never destructive. Such an attitude imposes a severe strain on the teacher but carries its own reward in the way in which the children will respond to it and will welcome such criticism. Their enthusiasm is unbounded when they feel that they are making headway, and genuine enthusiasm is all important in the art lesson.

CONNECTION BETWEEN PRELIMINARY JUNIOR WORK AND SENIOR SCHOOL WORK

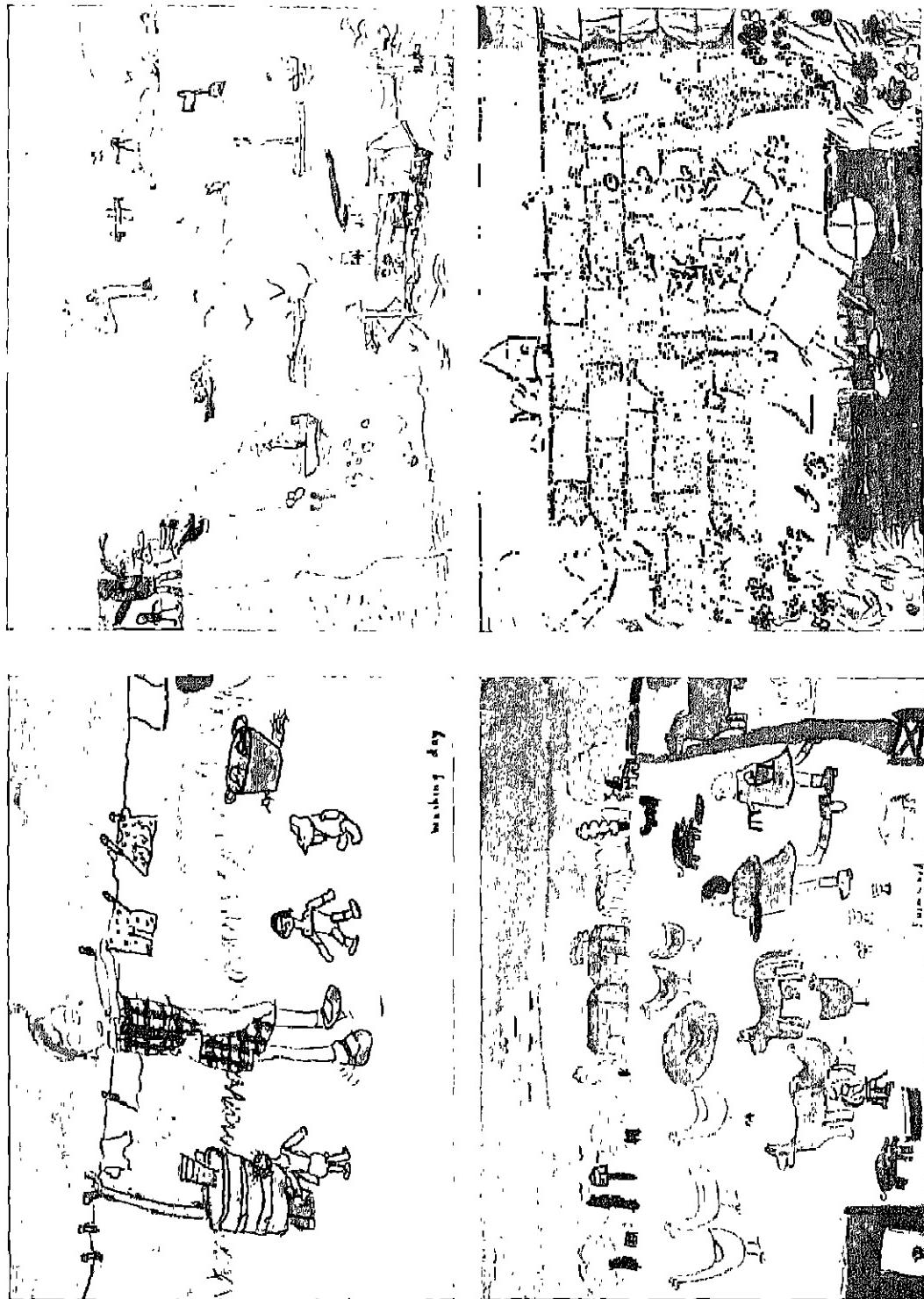
EXPRESSION, CREATIVE AND MEMORY DRAWING

Expression drawing.—The value of "expression" drawing is often questioned by unthinking critics. They take the view that such drawing, being untrained in the academic sense, is crude and therefore useless except as a playtime occupation; that it allows the child to use wrong technical methods, and that having had

no training and very little experience of life the child has nothing to express.

The fallacy of this point of view lies in the fact that these critics fail to realise that their criticisms are based entirely upon an adult standard of judgment. The drawings appear to be crude because the objects and figures represented do not conform to adult standards of good drawing—the child knowing little of proportion and perspective, and caring less—and accurate presentation

PLATE II
IMAGINATIVE DRAWINGS BY CHILDREN AGED 8 TO 9 YEARS



is out of the question for the young child: the very point which seems to be forgotten.

Efficiency in representational drawing is only a means to an end. The power to draw an object or a figure in exact proportion, correct outline and perspective, will not necessarily ensure the production of a work of art; frequently the very reverse is the case. It will materially assist the presentation of an idea, but the very first essential is an idea to express—and the child is full of ideas. A picture may be technically perfect in handling, with every detail accurate in drawing, and still not possess one iota of the life, colour, vigour and freshness of the cruder effort of the uninformed child. The former approximates to a skilfully coloured photograph which overwhelms the important parts with a maze of irrelevant detail of equal insistence. The latter is frequently art.

The child sees the subject in its mind as a whole, and, not being obsessed with the technical difficulties, proceeds to draw it quickly and joyfully with whatever medium comes to hand. He, or she, is not interested in irrelevant detail. The picture is vividly in mind, and consists of certain outstanding figures and objects in certain relationships. They are drawn (really from memory) and nothing else matters, neither background nor foreground. If it is necessary to the true telling of the story that all four sides of a house be shown at once—they are shown. And the child will look with a sort of pitying tolerance at the hum-drum unimaginative grown-up who points out that such a thing is, practically, impossible.

The early work is almost entirely symbolic in character, and this use of symbols with which to represent difficult subjects will last for a considerable time. It is this characteristic which makes the work appear so crude to the adult eye. But to the child it means more than could be stated in terms of accurate draughtsmanship. He lives for a time in a dream world of vivid realities in which a green-cheese moon and flying pigs or one-eyed men are part of the mixture

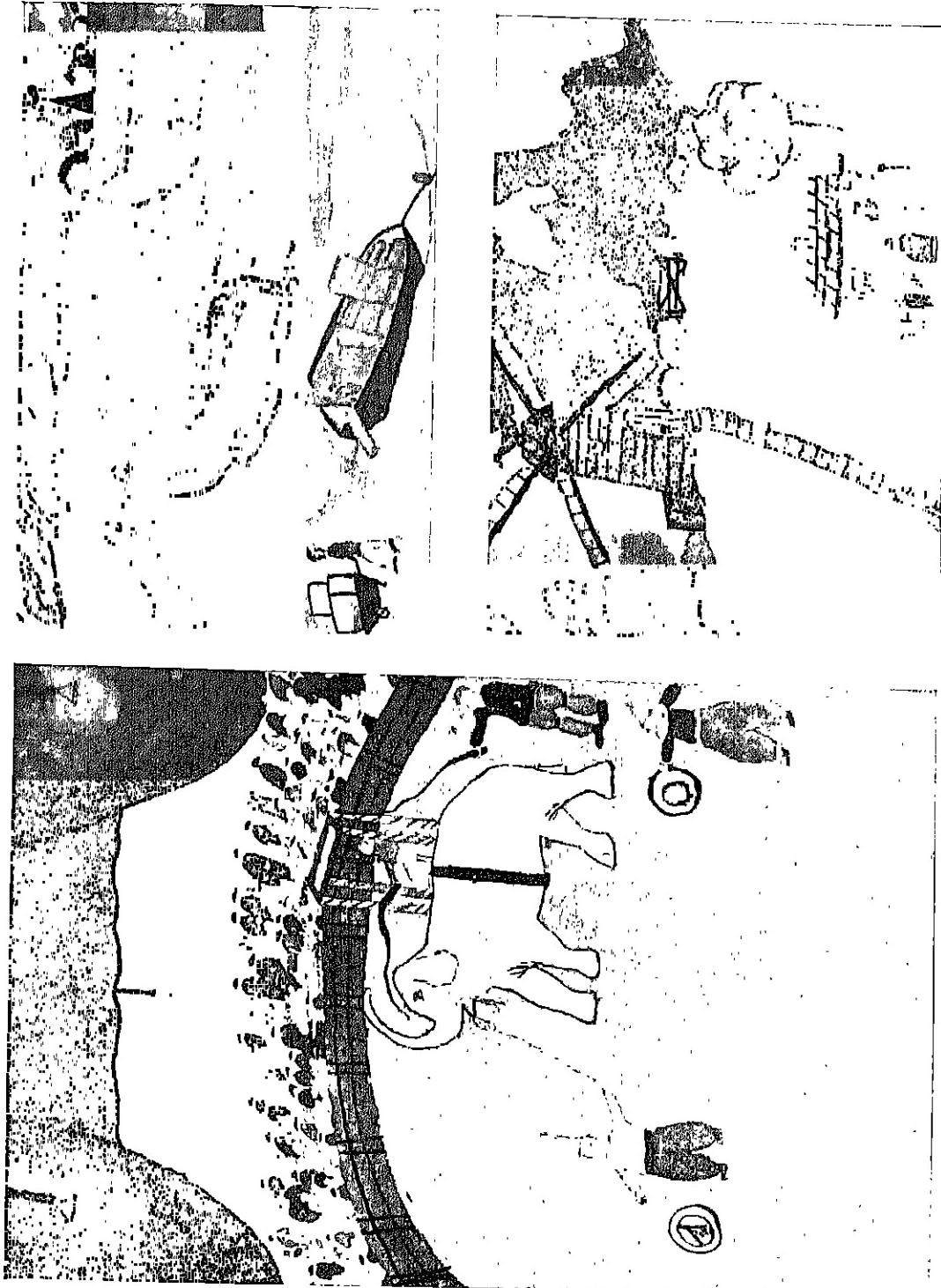
of fact and fantasy of which his happiest drawings consist. What point is there in trying to compel him, at this stage, to draw bananas, bricks and plant pots, in the hope that eventually he may be able to cope with more advanced objects?

What happens when this is attempted is that he loses interest. His imaginative powers are blunted and stifled. His drawing loses all spontaneity, and instead of being an affair of swift and happy execution becomes a tedious attempt at a faithful rendering of an uninteresting subject—with a blunt and unsuitable pencil clenched tightly, near its point, between thumb and fingers.

The young child, when given a pencil with which to draw, is obsessed by outlines. Obviously this is the only way in which he can use an exacting and unsympathetic medium, unless he covers the forms with the meaningless and smearable scribble which is the natural result of his attempts to "shade." He draws the outline of the form bit by bit, not having the ability to sketch it in as a "whole." Every teacher knows the stages that occur in the drawing of a spray of leaves; first the topmost leaf is drawn, starting at the tip and working steadily round the serrations until it is completed. Then the others, in order down the stem until, as they grow larger and larger, it is found that the lowest leaves will be off the sheet of paper. We then decide that the child has no sense of proportion, and so we put him on to drawing an attaché case or some similar article, forgetting that this exercise confronts him with a whole lot of fresh difficulties. Once again the teacher becomes exasperated. The child becomes discouraged. A bell rings, and the whole class puts away its materials with a sigh of relief.

We cannot aid the young child at this stage in this way. Later, when the much talked-of "co-ordination of hand and eye" has reached a reasonable stage of development and he is about to enter the senior school, it is not only possible but essential,

PLATE III
IMAGINATIVE DRAWINGS BY CHILDREN AGED 9 TO 11 YEARS



But at the moment we are concerned with the children in the junior school.

Memory drawing.—Probably the greatest aid that we can give is in the form of memory drawing. This trains the powers of observation whilst continuing to give full rein to the imagination and retaining the interest in the subject.

Memory drawing takes two main forms. In the first, an article or figure of some intrinsic interest to the child by reason of its colour, use or association, is placed before the class. It is studied for a minute or two and is then covered up or removed. This may be followed by drawing at once, or by making some attempt to fix the mental image by "shut-eye" drawing in which the outlines are traced in the air with the eyes closed before the actual drawing is begun. The drawing is completed as rapidly as possible, after which the article is produced again and the drawing is compared with the original. Corrections may be attempted, but it is better to incorporate the same article in a fresh expression drawing for this purpose, removing it beforehand so that the test may be made afresh. The second method depends upon setting beforehand a subject which is out of school and which is to be drawn upon a given date some days ahead. Sketches may be made during the interim period and as much direct observation as possible should be encouraged. Then, at the appointed time, the drawing may be carried out, preferably in a fresh expression drawing.

The pure expression drawing differs from these two types in that no direct and purposive observation of the subject is made beforehand. The exercise thus calls upon the full extent and range of retention of the child's memorising powers, and calls for his own arrangement of a series of previously unrelated images. In short he has to "compose" his own picture from a series of details memorised involuntarily at different times. And therein lies the greatest value of this style of work.

Some children seem to have an instinctive sense of pictorial values as shown in the arrangement of their drawings, but in most cases the details forming the subject-matter are scattered over the whole area of the paper. Each detail is kept carefully separated from others so that it may be seen in its entirety, and when an effort is made to add to the content, all kinds of apparently unrelated details may be introduced. It is seldom that the sense of "pattern" will be felt without some extraneous aid.

The real purpose of expression drawing.—Should, then, this type of drawing be left at this stage as being unproductive of good finished work and as having been merely an experimental stop-gap prior to the introduction of serious training, there is much to be said for the critics' standpoint. If on the other hand this work is carried on throughout the school life, and parallel with it, a definite training course is given in direct representational drawing (some of which is essential); the elements of colour theory applied in flat, decorative form; mass drawing in black-and-white and colour and simple pictorial arrangement, it will be found possible to produce work in the upper classes which will still be expression drawing but will also be trained and guided illustration work. It will take the form of wash drawing, line and wash, poster work, decorative work in panels or on book jackets, full painting, or lino cuts. Whatever the medium, it will be art in its purest form and with it will go the knowledge of how to apply these principles in the decorative work associated with the crafts.

The elementary draughtsmanship will not be lost. It will be trained, and will then take its proper place in the whole course; and the final aim of real appreciation of art which could never be attained by this means alone, will be reached by many of the children who would otherwise have only a very limited skill in drawing as the result of years of tedious effort with uninteresting material. In the application

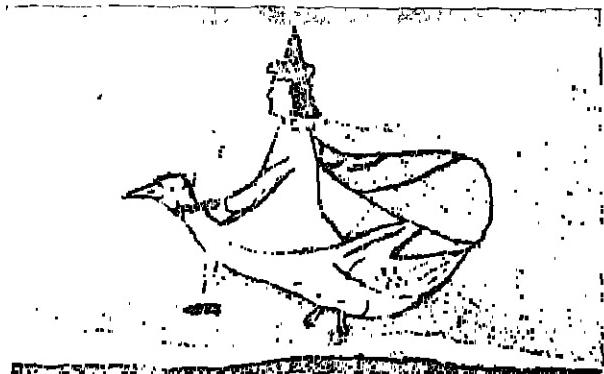


PLATE IV
"SET-SUBJECT" DRAWINGS BY CHILDREN AGED 7 TO 9 YEARS

of the principles of colour and design to the crafts, in weaving, embroidery and needlework, wood and lino cuts in black-and-white or colour, low-relief carving, wall decorations; whatever form the "expression" takes, the scope is unlimited. But the writer has found by experience that it is only by establishing a progressive course of training along with the unification of all the art and craft work that real satisfaction can be obtained for both teacher and pupil.

Materials for both junior and senior school use.—The first consideration should be to provide the children with suitable materials with which to work. If these are not chosen with some understanding and care, a very great handicap is imposed upon the children however sympathetic the teaching may be.

Pastels.—In many schools very little is provided beyond small boxes of crayons and pastels. These are far from ideal as a medium for children, younger or older, as invariably they are used upon grey paper. The fetish of supplying grey "pastel paper" for this work is directly responsible for a general misuse of the medium, for, in endeavouring to reproduce the brilliance of the colours as seen in the box, the children are led to "overload" the surface of the paper, a fault which destroys the special texture that it possesses and which results in an unpleasant greasiness in the appearance of the work. Children like strong, bright colour, and as their colour sense is not yet developed they should be encouraged to make use of it at this stage. Unfortunately, the very purpose of the grey-toned paper is to influence the intensity of the pastel by "showing through" the softly granulated strokes by which the medium should be applied, thus producing the "pastel tints" which are popularised by the drapers' stores. In short, the whole art of pastel drawing is to "suggest" the subject by using the least possible amount of pastel, applied in strokes of varying strength, length and direction, with stronger details of "accents" put in finally at full strength. This makes

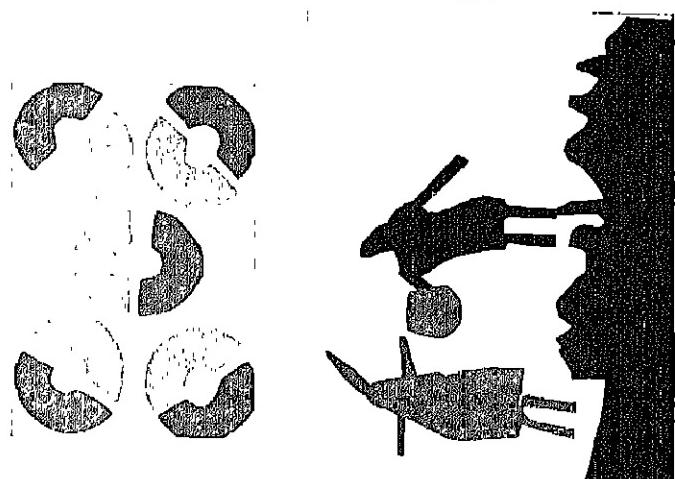
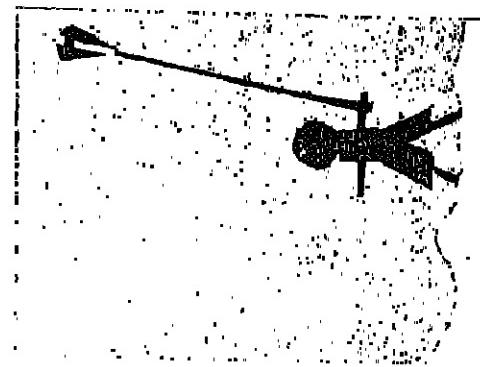
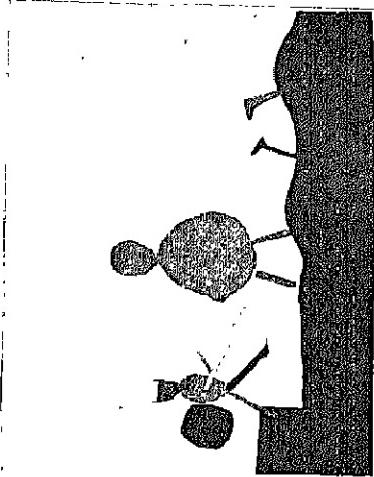
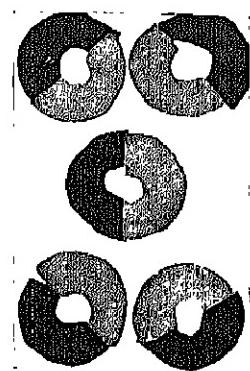
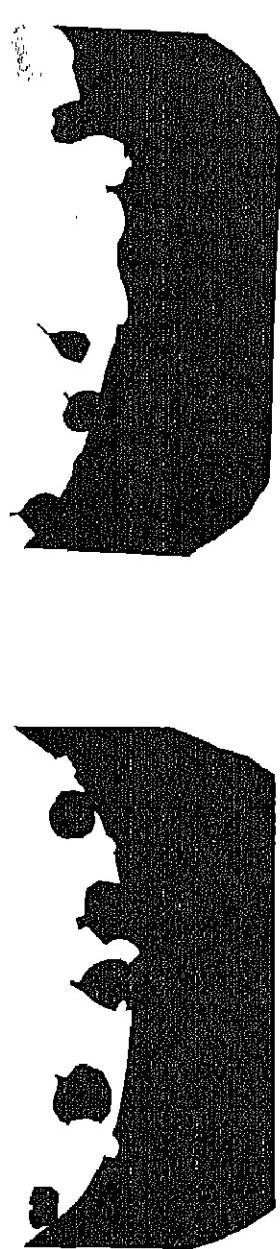
it clear that pastel drawing is one of the most difficult forms of art from the point of view of technique. But as the junior school is not concerned with problems of technique this does not matter. What does matter is the fact that there is no point in making the child draw in pastel on grey paper *unless* the correct technique is adopted.

It is really the grey paper, and not the pastels themselves, that is causing the trouble. If, on the other hand, light-tinted papers are used, such as "biscuit," the pastels become of much greater value as the light tint does not neutralise the colours to the same extent as does the medium or dark grey. Its colour will pervade the whole of the drawing, but it will allow the intense colours to retain their brilliance without making it necessary to load the surface of the paper. Whilst this factor may be a drawback to the accomplished artist, it is an added advantage in the case of the child's early efforts. Ease in putting down ideas on paper in colour is the primary object here, not the acquisition of technique.

It is not suggested for one moment, however, that the children should be instructed in wrong methods. They should be encouraged to *draw* in pastel, crayon, chalk or charcoal, but never to load it on to the paper and then to smear it about with the thumb. This is often done in order to get a smooth finish all over the drawing. This is contrary to the natural use and characteristics of the medium, and it would be much better to use water colours if this even smoothness of colour over large areas is all that is desired. The smearing and rubbing of the pastel over the surface of the paper destroys the freshness and brilliance of the colour, which would be retained in a clean wash of water colour.

Pastels, chalk and charcoal may be used to good effect in conjunction with simple washes of water colour on white or light-tinted paper. The paper should have an absorbent texture without much "dress." For pastel work only, the back of ordinary wallpaper gives an excellent surface upon which to work.

PLATE V
ILLUSTRATION AND PATTERN WORK IN COLOURED PAPER BY CHILDREN AGED 8 TO 10 YEARS



Method of using pastels.—Most of the drawing should be carried out in firm lines of varying strength. These lines may be crossed by others at various angles and may coincide in direction with other lines of different colour. In this way the colours may be merged one into another. The ground tint of the paper should be left untouched to show as much as possible. The small areas, or "accents," of strong colour—light or dark—should be put in very firmly with short strokes or dabs of colour, and these are the only parts of the drawing which are "loaded" on the surface.

Difficulties are encountered in representing shade and shadow. The shaded side of an object is that side which is turned away from the light source, and the ground tone of the paper should be used to help in representing this if the paper is fairly deep in tone. The shadow is the area of shade cast by the object on to another surface, and usually the "cast shadow" as it is called is deeper in tone than the shaded side of the object throwing it. It is a common practice to use a large amount of black in representing this cast shadow, but the children should be encouraged to make use of the other colours instead as the black will make them look too dingy and harsh.

Young children cannot appreciate these finer differences in values as between cast shadow and shade; neither can they understand the qualities of colour and colour influence which affect the use of "opposites" or complementaries in shade areas. These questions should be left until the proper moment occurs in the teaching of colour theory elements in the senior school, but whenever it is possible to do so the children should be guided in the proper way of using the medium without the use of any technical terms.

Water colours.—Ordinary water colours are not required in the junior school except for special purposes such as the printing of lino cuts. A certain amount of formal instruction in their use is necessary before the expense incurred thereby is justified by

any work of value. Instruction in the methods of laying washes, either plain or superimposed, and of painting a picture as a whole instead of piecemeal, is best left until it can be combined with the colour teaching referred to above.

Powder colours are eminently suitable for the broad expression work of the juniors, and they may be obtained ready for mixing with water for direct use. If the children are encouraged to use these colours freely, on large sheets of cheap paper, they will tend to use them naturally in washes and in a broad and simple manner. This will give them the finest preliminary training that could be had in the use, later on, of water colours proper. They will not be afraid then to lay the colour on with a full brush and to leave it alone.

These powder colours may be used both for the broad illustration work of the juniors and for the rough work of the seniors, such as their preliminary sketches for more carefully finished illustrations, posters and other decorative work.

Paper.—Again on grounds of expense, it is not necessary for junior children to be provided with cartridge paper; neither is it necessary for the rough work of the seniors. There are several excellent and very cheap papers on the market which are quite suitable for work in powder colours, and other media.

If, as has been suggested already, sheets of paper of about $\frac{1}{2}$ -Imperial size are given to the children and are held upon light drawing boards or upon strawboards with paper clips, the drawings may be made of reasonable size. This has a direct effect upon the natural method of working adopted by the children. When they are restricted to a tiny page in a drawing book they tend to adopt a "niggling" style in all their work, for they cannot lay a decent wash on a small bit of paper. With the larger sheet to draw upon they will use a freer style, especially when they know that it is not a "crime" to spoil the paper by trying to do something which otherwise they would not attempt. The cartridge paper which was wasted in

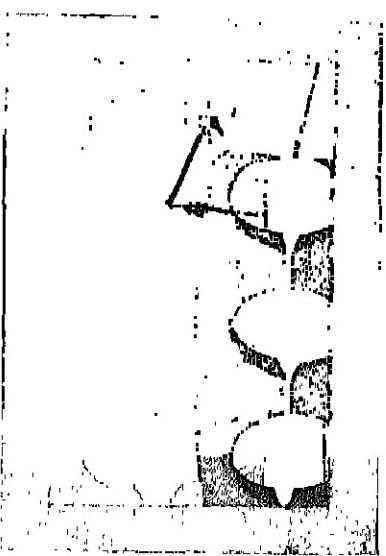
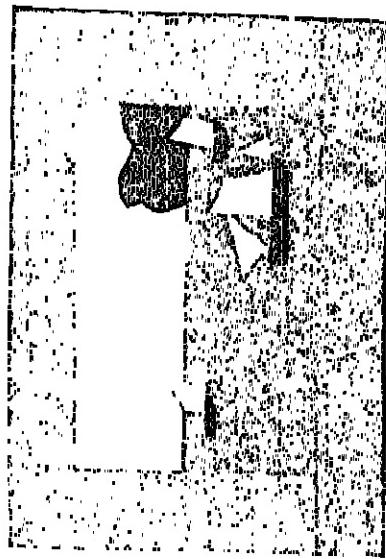
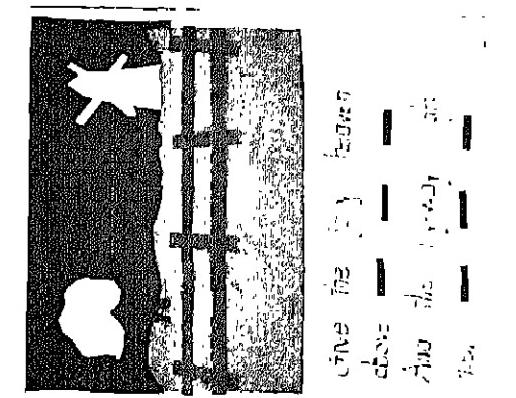
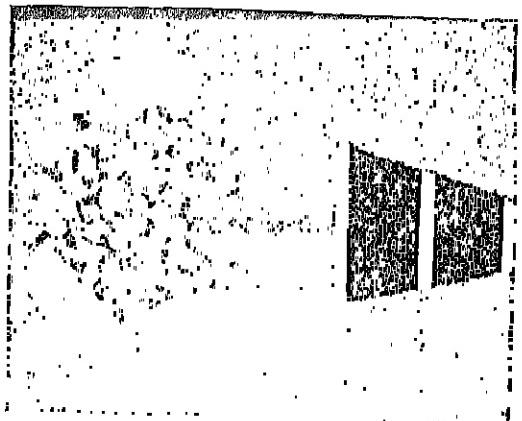
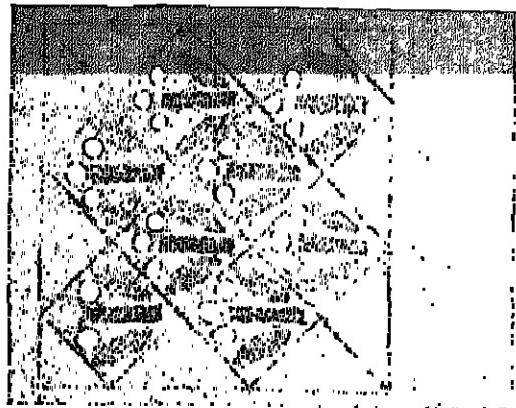


PLATE VI
ILLUSTRATION AND PATTERN WORK IN COLOURED PAPER BY CHILDREN AGED 9 TO 11 YEARS

the drawing book may be used to better effect in sheet form in the senior school.

The improvised drawing board is recommended because so many lessons still have to be conducted in the ordinary classroom or in an art and crafts room in which there is no convenience for the storage of easels. Several forms of light easel are obtainable, or they may be made in the school workshop, but unless there is provision for storage they are more nuisance than they are worth. The easel is far and away the best mount upon which to train children to draw, as it enables them to sit upright to their work; to work at arm's length, and to use the whole arm for drawing and painting instead of only the fingers. If conditions are favourable for their use, and there is room for their disposal both in use and in storage, easels should be used for all the free drawing and painting. The boards, then, may be reserved for lettering of the more exacting type and for analytical "nature" drawing.

Brushes.—For general junior and senior work these should be of hog-hair, both in the round and the flat shapes, and with long handles. The round brushes hold more colour than do the flat ones but the latter are very useful for suggesting certain effects, as a curved stroke may be made which diminishes from the full width of the brush to a fine line, or *vice versa*. The flat brush is excellent also for poster work and linoc-block printing in the senior school.

The sable brush is very expensive, but it is the best for more advanced water-colour work in the senior school. Alternatively, cheaper varieties may be used, with the exception of the "camel-hair" brush. This should be avoided as it will not keep its shape or position and does not allow of any firmness of stroke.

Another expensive but extremely useful brush is the Siberian hair "mop." This is a large brush which tapers to a sharp point and which holds a great deal of colour. It is very useful for laying washes of colour on large sheets of paper, and if any tinting

or large superimposing washes are required this is the best brush to use. One such brush would serve any similar purposes for a whole class.

Palettes.—Large palettes are necessary, but they need not be of china. Reference has already been made as to suitable substitutes for the small and expensive china palettes, and for the need of a large table or wall bench upon which the main stock of colours may be kept, the children drawing upon these as they are required, or being issued with them by the teacher if a congested room makes it inconvenient for the children to get their own supplies.

Coloured papers.—Although only a very limited range of hues, tints and shades is available at a reasonable price for school work, these papers are most valuable for the training and experiments of both junior and senior children.

Reference has already been made to the advantages gained by the use of a limited and definite range of colour in the early stages and by the comparative accuracy from the point of view of the study of colour relationships, of the papers now being manufactured. One fact alone is sufficient to warrant the use of these papers—the fact that a common standard is provided upon which to begin experiments. When the hue of blue is mentioned, the children have one blue hue with which to work, and one only. If pigments are being used and the children mix them themselves, each child has a different blue to begin with, so that the result of the admixture of (again) differing hues is complete chaos within a very short time. If the teacher has the time to mix the whole of the colour for the class, which is very unwise and very unlikely, a different hue strength is almost certain to occur at every class meeting. Another advantage gained is the purity and cleanliness of the colour being used in paper form, whereas the colour-boxes soon become filled with dirty half-pans, owing to the careless manner in which colour is taken from them with an unclean brush. Finally, the papers are

PLATE VII
A VARIETY OF DESIGNS DONE IN COLOURED PAPER BY CHILDREN AGED 9 TO 11 YEARS

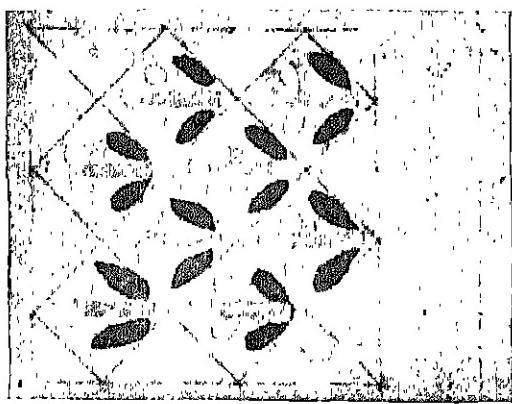
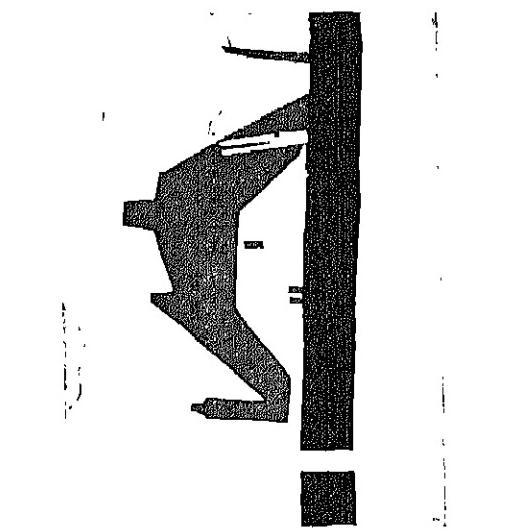
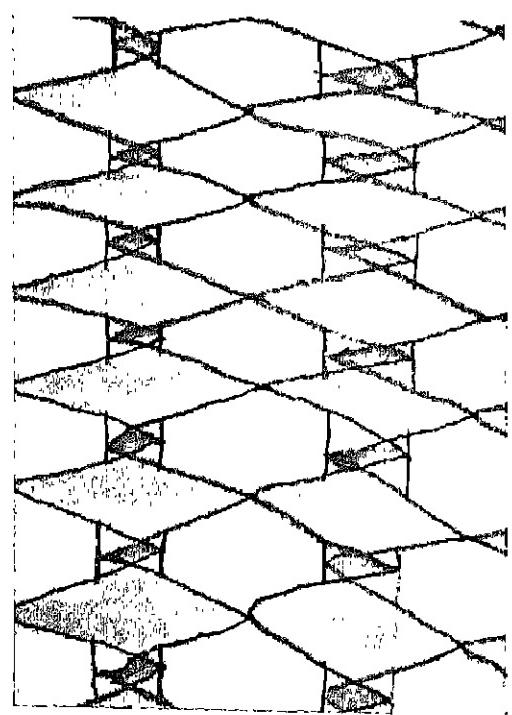
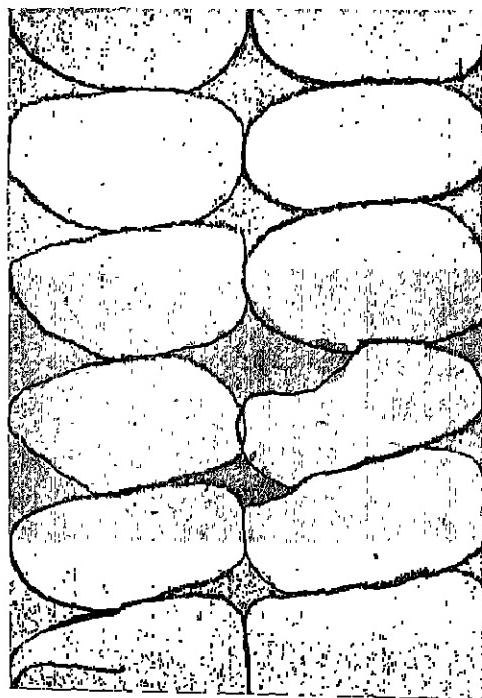
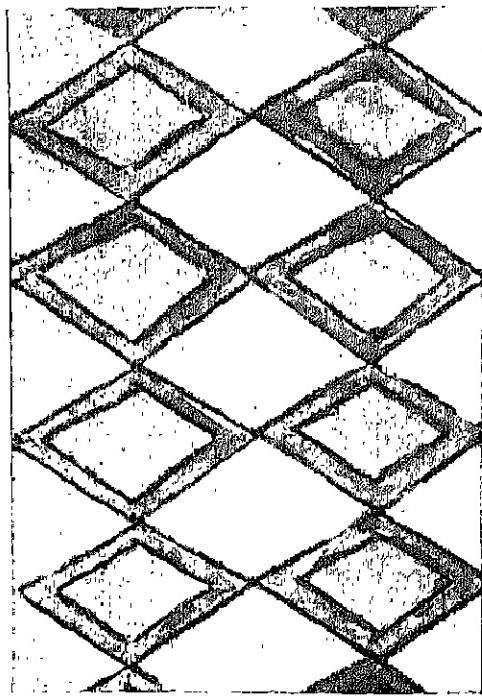


PLATE VIII
PATTERNS DRAWN AND THEN COLOURED BY CHILDREN AGED 6 YEARS



productive of more rapid progress for they are easy to handle and do not require the amount of apparatus which is necessary for work in water colours.

Sugar paper.—This is found to be too expensive for many schools, but it is an excellent paper for senior children's work in colour or in strong line. Its surface is absorbent and as it is pleasantly tinted it has a softening effect upon the harshness of colour which accompanies many of the early efforts of the children. This same quality makes it especially suitable for the use of body colour—that is opaque colour—for the strong lights and darks which, in addition to the ordinary transparent washes and the strong line work, give great brilliance and liveliness to a painting carried out on this paper. For these reasons it is one of the best papers for decorative drawings and poster work.

Other considerations.—Having thus decided upon the aim which is to underlie the teaching of all the branches of creative drawing to be taken during the course, and having chosen the materials, it is as well to consider the outlook of the children upon this kind of work. Roughly speaking, they may be said to pass through three stages in the course of their development, from the beginning of the infant school life up to the end of the junior school. These stages might be termed the "symbolic," the "transitional," and the "realistic."

Symbolism.—The very young child takes an intense delight in drawing things of which he "knows" rather than the things which he may see about him at the moment of drawing. He does not draw, therefore, from direct observation but from an inner conception which, to him, is very vivid.

As he does not possess the power to visualise detail in its correct relationship to the subject as a whole, he draws the bare essentials which have caught his attention and which have impressed themselves upon his memory. Thus, to him, the only important parts of the human figure are the head,

with the eyes and mouth as a rule exceptionally large; the arms and hands (and a little later, the fingers), and the legs and feet. The trunk does not impress itself upon him as being of any importance, and therefore he ignores it for a considerable time. This characteristic is common to children of all nations, irrespective of their surroundings or home conditions.

Although the child of four to five years of age is attracted by bright colour, he shows the common tendency to draw first in outline. The shape of the object is of first importance to him, and the colour comes later. His undirected efforts in drawing will consist of a mixture of symbolic shapes and apparent scribble, but it is interesting to note that the same combination of both will be repeated time and time again, with untiring satisfaction to himself. At this stage he draws almost entirely for himself and not for any observer; and in the same way that he chatters to himself whilst engaged in a game with his toys, so he will draw the limited number of shapes that he is capable of making.

As he gains sufficient muscular control, he replaces the zigzag lines and the irregular ovals with which he began by definite shapes which are more deliberately drawn. These shapes represent everyday things pertaining to his surroundings in which he is intensely interested. The human beings with whom he comes into contact daily, the dog, the cat, the chairs, the bath and similar subjects, all these are seen vividly by the child and are drawn from the impressions so gained, but not from direct observation in the "object drawing" sense.

Although the young child appears to be indifferent to adult appreciation of his attempts to draw, he is very sensitive to any kind of destructive criticism. For this reason the teacher of the youngest children should give them every encouragement to make their own improvements to the drawings at this stage and, although advice and guidance may be given freely, they should take the form of suggestions based on the child's

PLATE IX
FREE BRUSHWORK PATTERNS ON THIN PAPER BY CHILDREN AGED 6 TO 8 YEARS

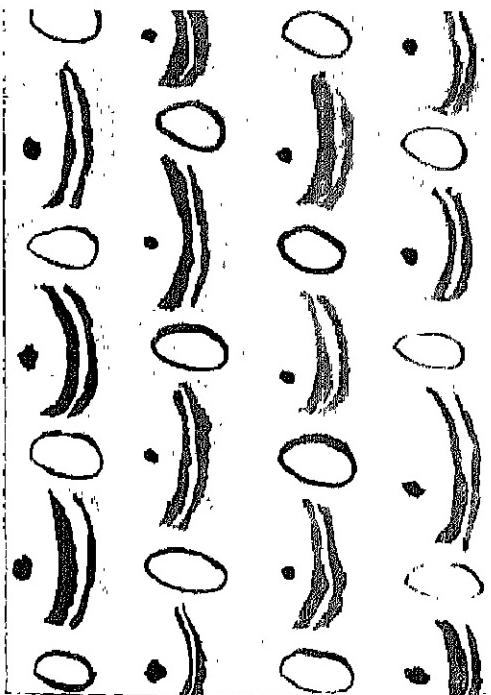
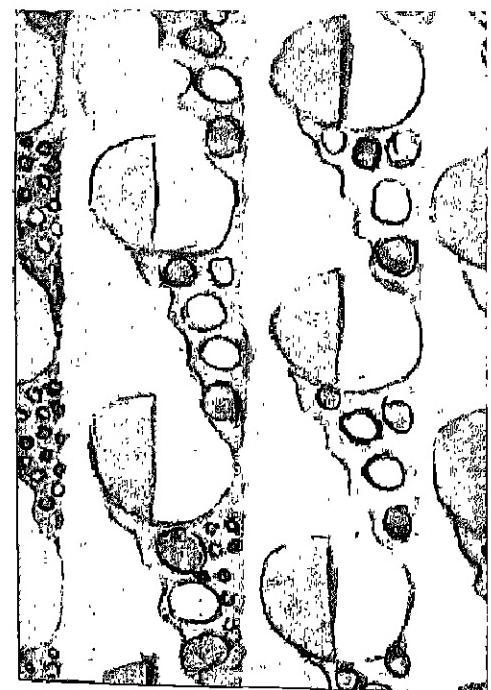
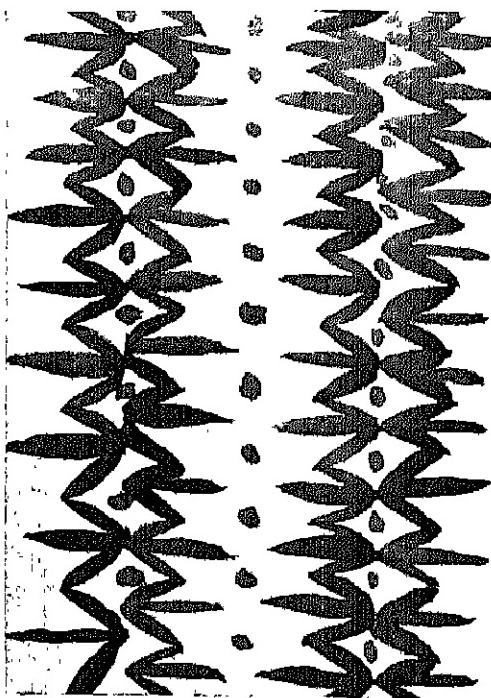
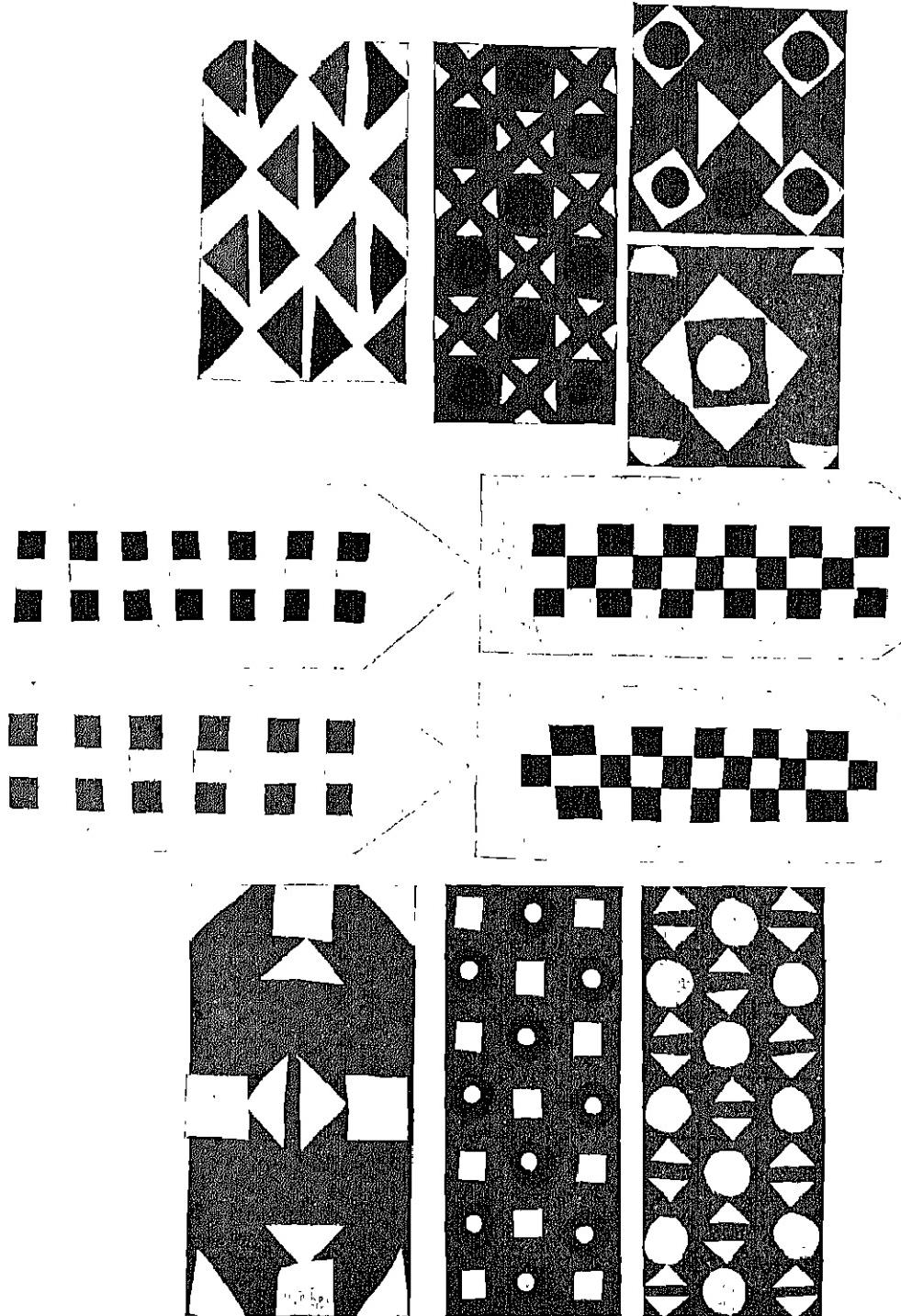


PLATE X
WEAVING AND PATTERN MAKING IN COLOURED PAPER BY CHILDREN AGED 7 TO 9 YEARS



work. Whilst he is interested in the improvement of his own drawings, he is not interested in carrying out some apparently meaningless exercise devised by the teacher. This encouragement by suggestion becomes of first importance during the next stage in development.

The transitional stage.—During this period, which will extend from the latter part of the infant school to the early part of the junior school course, the child will become dissatisfied with many of the symbols with which before he was perfectly content. His perception of form and detail is keener, although he will still have no sense of distance or space in his pictures as regards relative size. He will, however, give the greatest prominence to the most important things in his drawings by making them larger than any other items in the same plane. He will discard those symbols for which he is now able to produce some attempt at realism and will retain those which represent objects too difficult for realistic representation. Thus his work will consist of a mixture of the two styles of drawing.

The function of the teacher is still to act as a sympathetic guide. Suggestions should be made, especially when the drawings show the beginning of a feeling for proportion. Other media may be brought to the child's notice and coloured paper will be of great help at this stage, mainly because it enables the child to introduce shapes in flat colour instead of in outline only, or of outline filled in wholly or partially with colour. The use of colour in this way helps the child to concentrate his attention on the important parts of his pictures and, unwittingly, on the arrangement of these parts, for it will be found that many children possess an instinctive and natural sense of pattern which is expressed in their handling of the backgrounds of their drawings. This goes to show that the common arrangement of two or three objects against an empty background of white paper, which is seen so often in the drawings by senior children, is an artificial method which has been foisted upon the

children in the attempt to make them concentrate wholly upon the objects themselves. The natural tendency of the child is to "fill up" the background and to utilise all the space provided by the paper.

By encouraging this tendency the teacher can ensure that the ground is properly prepared for the subsequent training in pictorial and decorative composition which forms so large a part of the senior school course and which is based directly upon the work done in the junior school.

Realism.—The development from pure symbolism to realism is very gradual, so that it is impossible to make any hard and fast demarcation between them in relation to the ages of the children. The change depends upon the opportunities which have been provided for the youngest children for painting and drawing, and upon the natural abilities of the individual children. But, as a general rule, it may be assumed that realism will play a large part in the work of the last two years in the junior school, that is, between the ages of eight and eleven years.

No longer do the children draw for themselves alone. They are critical of their own work and of the work of others in the class, and they are ready to accept help and advice from the teacher.

Such help should never take the form of an alteration or an addition to the child's drawing by the teacher. Whenever possible, the child's attention should be drawn to a simple example in his own surroundings which will help to solve the particular difficulty, usually one of the many perspective problems which arise in connection with memory drawing. If it is really necessary for the teacher to make a small sketch for the purpose of explaining a point to the child, the drawing should be made on a separate piece of paper, after which it should be taken away by the teacher; or, if it concerns the whole class, a sketch should be made on the blackboard and should be rubbed off as soon as the explanation is finished.

It has been customary to give formal lessons

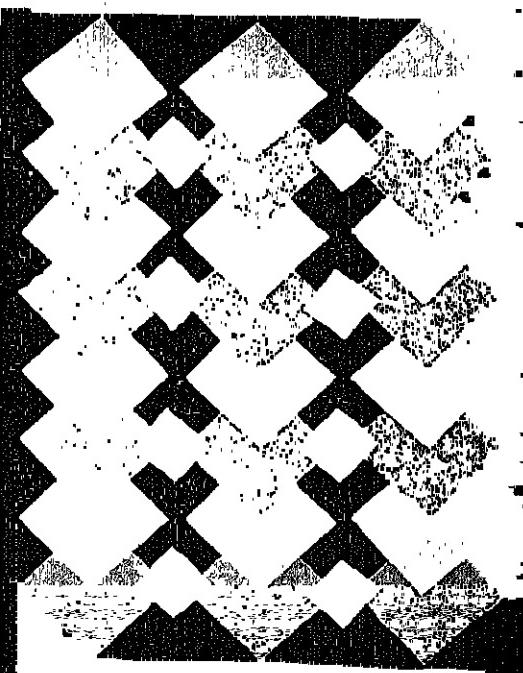
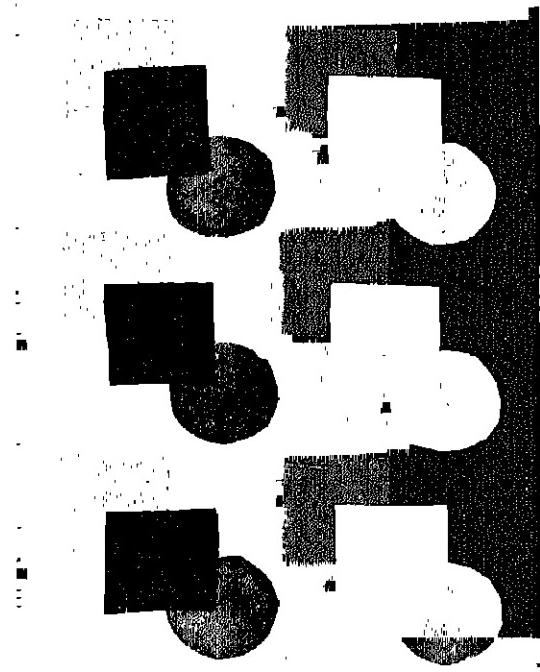
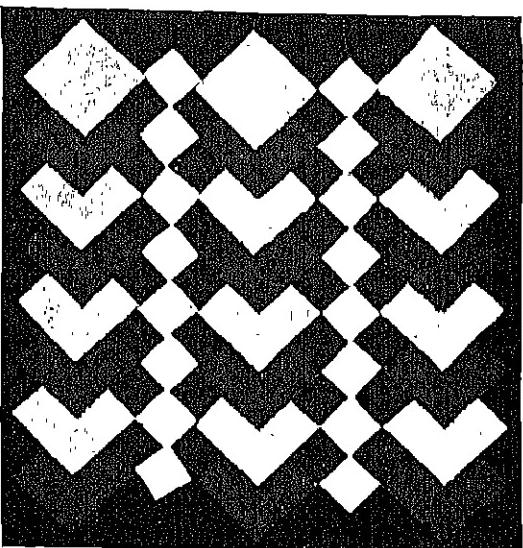
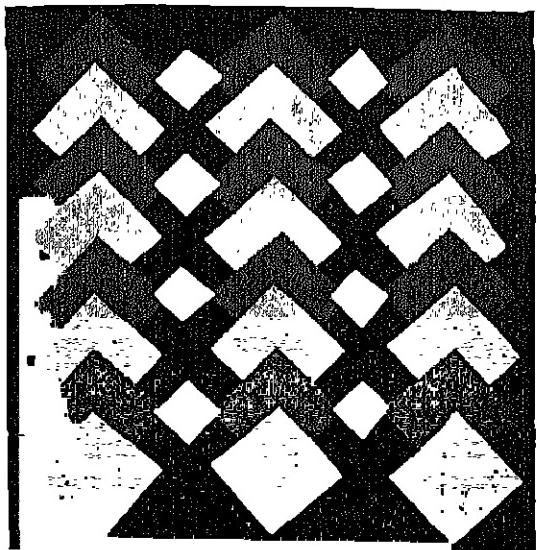


PLATE XI
FIRST LESSONS IN COLOUR ARRANGEMENT BY THE USE OF COLOURED PAPER PATTERNS—
CHILDREN AGED 10 YEARS

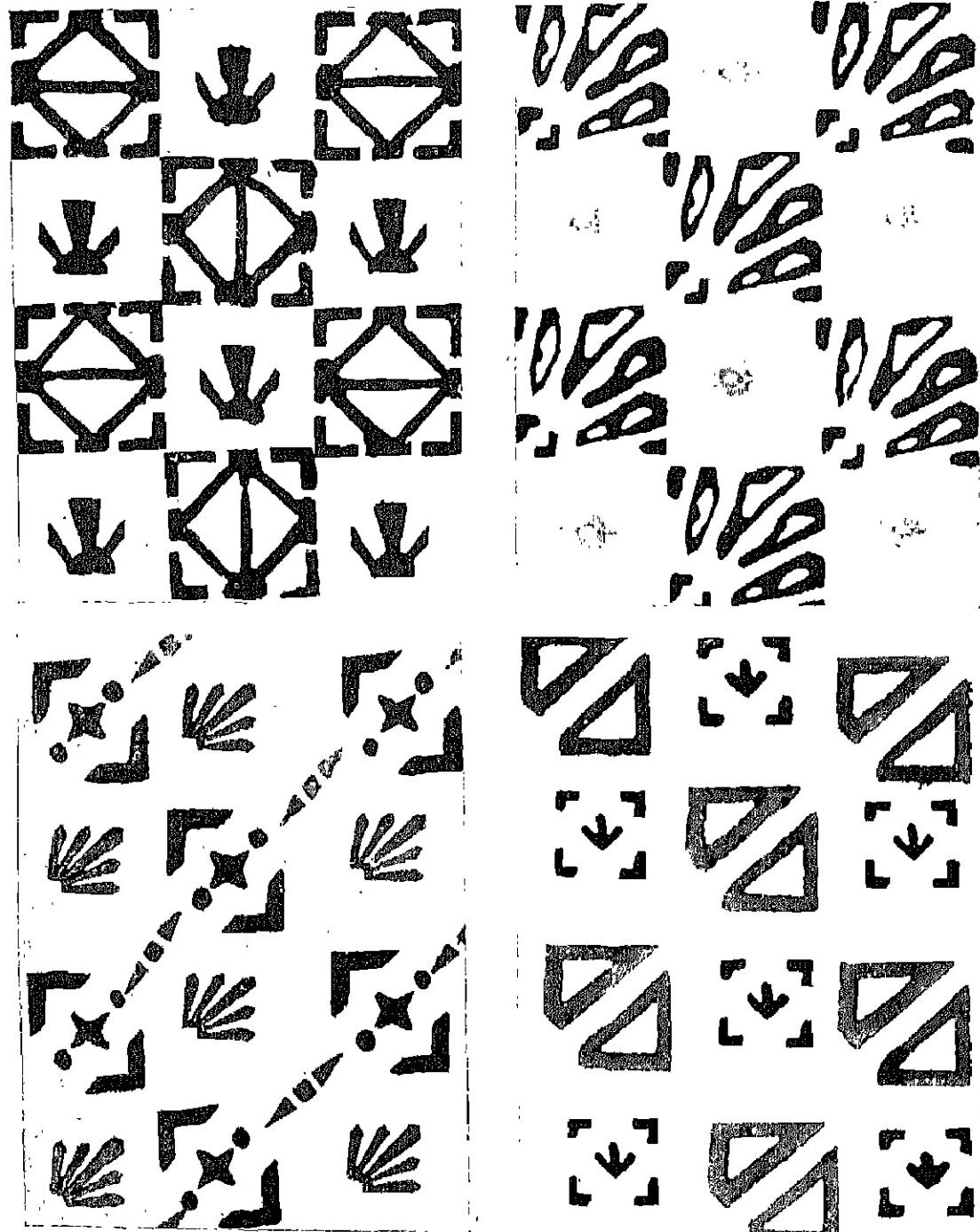


PLATE XII
FIRST PRINTED PATTERNS—POTATO-CUT UNITS BY CHILDREN AGED 10 YEARS

in the first elements of perspective drawing at about this stage. These are definitely undesirable as they treat the subject in a manner which is entirely unsympathetic to the style of work of the children, whereas in most cases their difficulties may be overcome by reference to homely examples which they can observe for themselves.

The greatest difficulty from the teacher's point of view is encountered during this period in the children's dissatisfaction with many of their attempts at realism. They have become aware of the crudity of much of their work, and in trying to get it "like" the subject they are discouraged by their apparent failures to do so.

The teacher's attitude should help them to realise that they are expected to get the right feeling, or impression, into each picture, and that this is not done by the accurate representation of detail alone, if at all. They should be encouraged to practise the sketching of those subjects which give them the most difficulty, but it may be demonstrated to them, by simple examples, that a very impressionistic drawing may convey to the full the feeling of the subject whilst an elaborate and highly finished drawing in detail may fail completely to do so. Even young children at this stage will unhesitatingly choose the drawing which is "alive" if asked to do their own selecting.

Thus, at the end of the junior school all the teaching has been concentrated upon the preservation of the creative qualities of this kind of drawing; the preservation of the interest and confidence of the children in their work, and the natural acquisition of knowledge of form, colour and proportion by their own observation. The function, then, of the senior school course is to cultivate and to preserve these qualities, whilst utilising them as a basis for more academic training.

PATTERN DESIGN

This most important part of the work will be conducted in the junior stages with

a view to its direct application to the crafts, but as a large part of it will consist of free brushwork the pattern designing will take two distinct forms. The first one will show the children that pattern design is essentially a "building-up" process; that they cannot "think of a pattern" and draw it as a whole in the way in which they can draw a single object. It will also give them practice in those free movements of the arm and hand which, in conjunction with a deliberate attempt at control, will give them such valuable help in their larger illustration work. The second type will consist of repeated units, which will be printed or stencilled. The purpose of this is to enable the pattern to be used as part of a craft project, and to avoid the waste of time that would be incurred by the tedious process of continually re-drawing and colouring the same unit. This kind of pattern is purely formal in arrangement.

Later on, in the senior school, the children will develop this pattern work to a more advanced degree and they will eventually be shown the connection that exists between the formal arrangement of pattern units, as for an endpaper, and the informal arrangement of varied units, as in a picture. Thus the study of "pattern," in one form or another, runs throughout the whole of the art course from the infant school to the senior school and it acts as the core about which all the other work is built up. It occurs, in various forms, in lettering, in colour relationships, in pictorial and decorative work, in black-and-white and, of course, in craft work of all kinds.

Squared paper is used in many schools for an early stage of the pattern work, and it is useful for experimental purposes in the planning of formal units of all kinds and for simple patterns intended for stitchery. It has the drawback that it tends to over-emphasise, in the child's mind, the importance of "geometrical" forms as a basis for unit repeats, thus narrowing the scope of the work considerably.

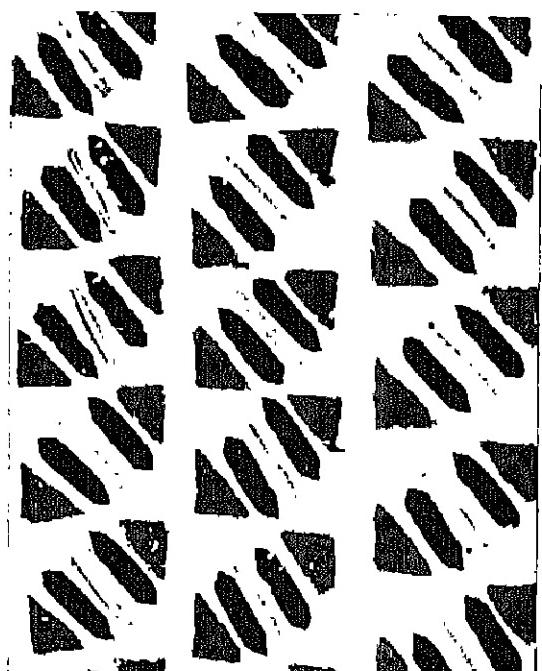
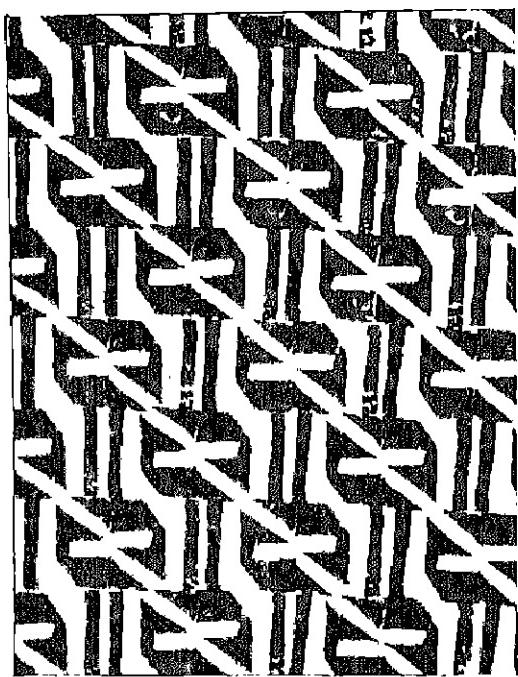


PLATE XIII
PATTERNS PRINTED FROM POTATO-CUT UNITS BY CHILDREN AGED 10 YEARS

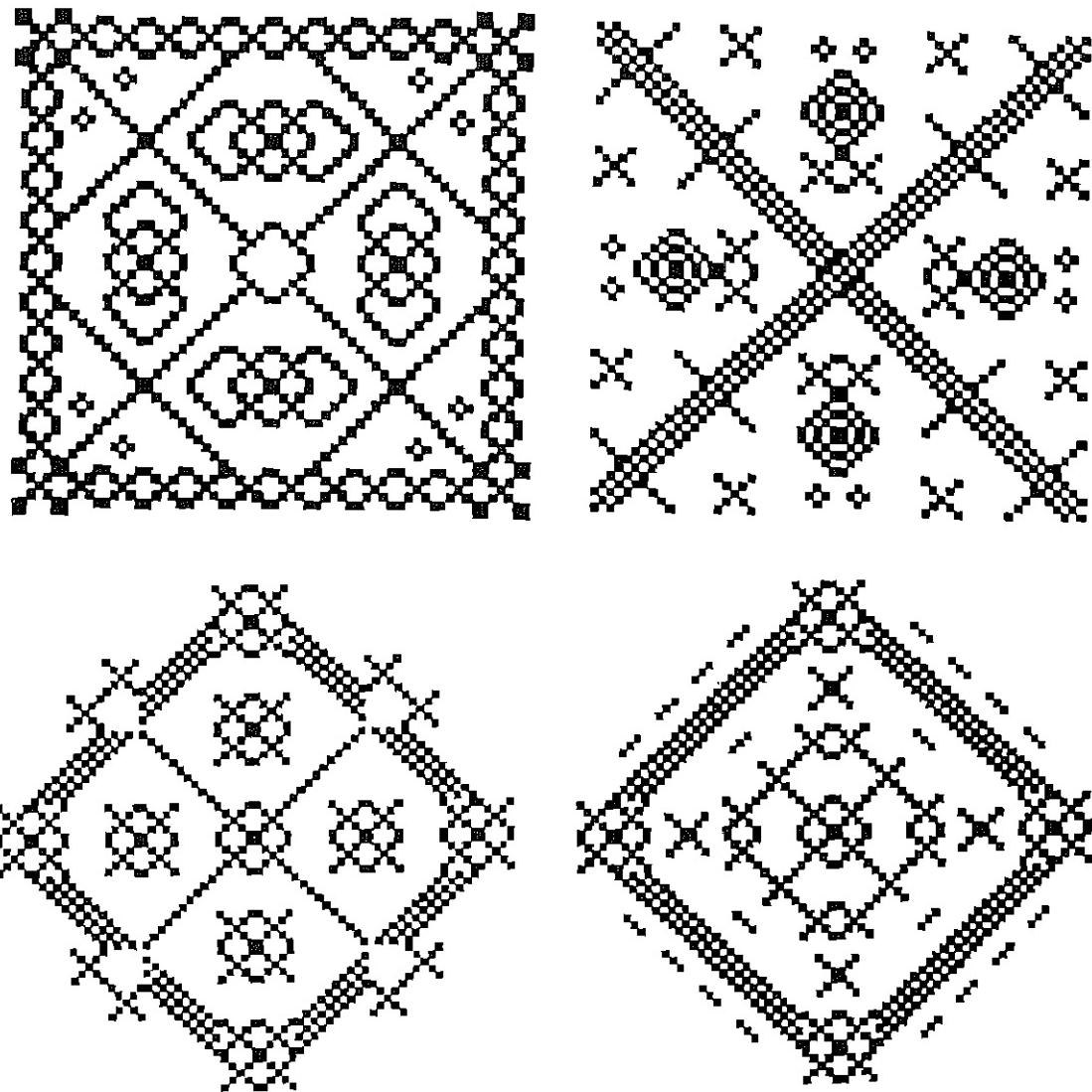
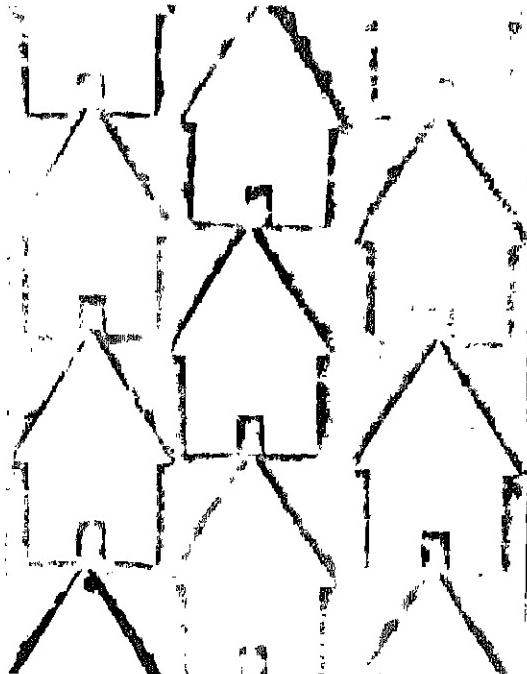
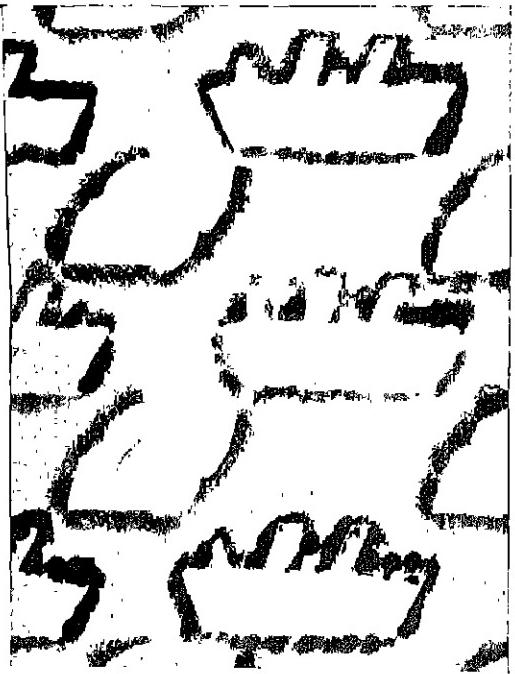


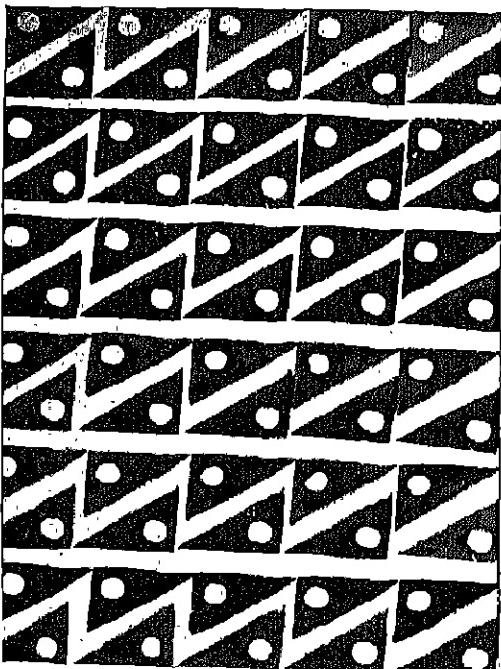
PLATE XIV
PATTERNS DEVELOPED ON SQUARED PAPER AND DRAWN IN MANUSCRIPT INK BY CHILDREN
AGED 10 YEARS

For the earliest experiments with colour units, the coloured papers are useful for a short time. By folding strips of these papers before cutting them, various units may be produced rapidly and may be pasted on to a suitable ground in different arrangements.

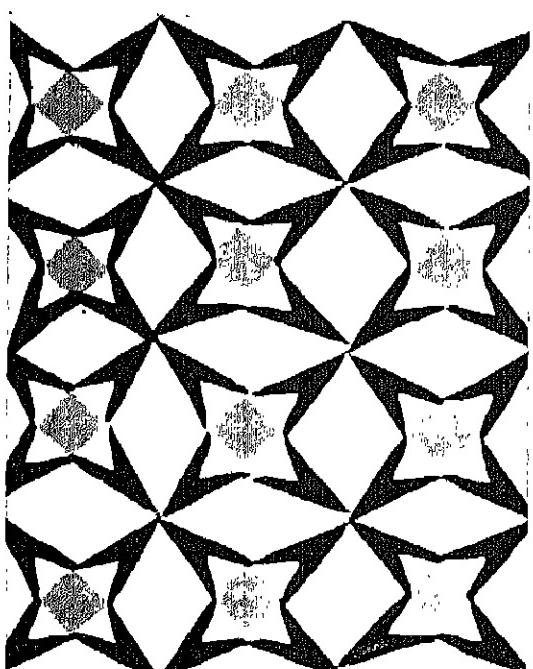
Object drawing need not be entirely excluded from the junior school, but it should take the form of drawing from direct observation some article that is to be included in an illustration of which it forms a part. The children should never be led to regard such drawings as isolated exercises



EDGE-STENCILLED PATTERNS



POTATO-CUT UNIT PATTERN



LINOLEUM UNIT PATTERN

PLATE XV
PATTERNS BY CHILDREN AGED 10 YEARS

and if they are utilising them in this way, at once, it is possible to deal with many of the incidental problems of proportion and technique as they arise and in a manner that is interesting to the children.

A junior school course conducted along the lines that have been indicated here will ensure that the children enter the senior school in a receptive state of mind. They will not have been discouraged beforehand.

THE SENIOR SCHOOL COURSE

Terms used in connection with the diagrams and illustrations

Hue.—A colour at full intensity.

Shade.—Any hue which has been darkened by the abstraction of light, or by the admixture of pigment such as black, grey, or the complementary hue.

Tint.—Any hue which has been weakened in intensity by the addition of light; i.e., by the addition of water to a wash on white paper; or by the addition of white pigment.

Tone.—The relative lightness or darkness of any hue or neutral.

Value.—The relative intensity of any hue, taken in conjunction with its adjacent hues or neutrals.

Neutral.—A grey which may be a true neutral, unbiased towards any particular hue, or which may be an effect obtained by the use of partially greyed hues giving an impression of neutrality to a greater or a lesser degree.

"Broken" colour.—Normally, the use within a given boundary of a number of hues, tints and shades which are loosely "broken" one into the other without a definite individual boundary. An effect which approximates to neutral, as in pictorial backgrounds.

Pictorial design.—Some teaching of the elements of pictorial design is necessary if the imaginative work is to be used as the vehicle for general training in drawing, composition and colour. They cannot all be taught at once in the form of academic

exercises, but they should be dealt with as occasion arises in a natural manner. Technical terms should be avoided throughout the teaching of these stages, but it is essential that the main principles which are involved should be understood by the teacher.

The elements of design do not change with the subject or with the medium being used, nor do the laws of composition vary to suit individual styles of painting and drawing. Every illustration is a design in line and form, tone values and hues. As such it must conform to the laws of design, and it will be found that the best work is that which is developed along these lines, whatever its style may be.

The observance of these rules does not in any way limit individuality of conception or treatment; it merely ensures the fullest assistance in the expression of individuality in art. The rules are not concerned with either the subject of the picture or the technique to be employed; they are concerned with the arrangement of the material to the best advantage.

It is the complete failure to understand this point that has led to the unthinking criticism of expression drawing in so many schools. It has not been developed, but has been regarded merely as a form of rebellion against the more academic types of drawing practice. Actually each type should help the other, as a formal drawing without inspiration is as bad as an imaginative drawing without any order or arrangement.

Media.—These should be restricted in the first year to pencil, charcoal, coloured paper, tempera colour and body colour. Pastels are not recommended at this stage for the reasons already given, except for the purpose of adding colour notes to a drawing which lacks in "liveliness"—although this may be done just as easily by the use of body colour.

Suitable papers for this work are sugar paper, kitchen paper and any other cheap paper which has an absorbent texture with not too much dress. Cartridge paper is unnecessarily expensive.

Method.—A balance should be kept between the three main forms which the illustration work should be allowed to take. These are quick sketching from life or from the object; the use of coloured papers to give training in the conception of simple forms as a whole instead of as a "bit-by-bit" outline, and the ordinary full illustration of a set subject. Further training at this stage should consist of the definite planning of each drawing within the bounding lines of the edges of the paper, or of a rectangle drawn upon it.

This will be a great advance upon the junior school stage, in which the parts of the subject are placed indiscriminately on the paper.

The elements of pictorial design.—For the sake of clearness these are dealt with here under one heading. They should be taught one at a time, as the work progresses, in the simplest possible terms and by simple demonstrations on the blackboard. There is bound to occur considerable overlapping between the various elements, as they will all be present in differing degrees of importance in practically every pictorial composition. But the teacher's aim should be to handle the subject, in every demonstration, so that one element at a time is made to be of major importance to the illustration.

At the time of each demonstration the children should take notes and diagrams

of the explanations given, and should attempt an original example alongside the one given, using the direction as a guide. This will be found to be of much greater value than a mere copy of another picture.

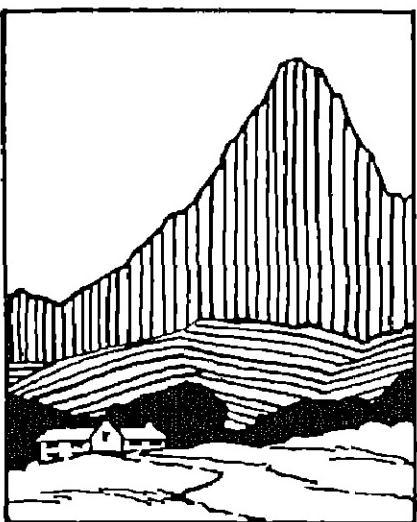
The same practice should be followed throughout the course, so that at every stage of progress the children have a definite record of the fresh material to be absorbed, along with an exercise which will drive the point home.

Dominance, proportion and subordination.—These elements as a rule are treated separately, but they are so inter-dependent in practice that they may be considered together.

Every design, pictorial or otherwise, should possess one dominant feature. It does not follow that it will be the largest in area or the brightest in hue. Frequently it is otherwise; the dominance being obtained by position or by contrast of hue, tone or line direction.

Figs. 1, 2 and 3 (Plate XVI) show examples of dominance in pictorial work, which should be looked for in the practice of sketching outdoors or in building up subjects from material gathered in various ways. Without dominance of one feature the design will lose its unity of effect. Everything should be subordinated to the one main theme or feature of the picture, otherwise the eye will not be led, easily and unwittingly as it should be, to the main centre of interest, but will wander uncertainly over the whole design not knowing what to look at especially and confused by the variety of competing interests. This fault is illustrated in Fig. 4, in which a meaningless repetition of forms destroys the unity of the picture. In short, the material in Figs. 1, 2 and 3 is *arranged* within the panel, whereas that of Fig. 4 represents a small section of an ordinary landscape as it might be drawn by a child, just as it occurs as part of the observed view but completely lacking in pictorial value.

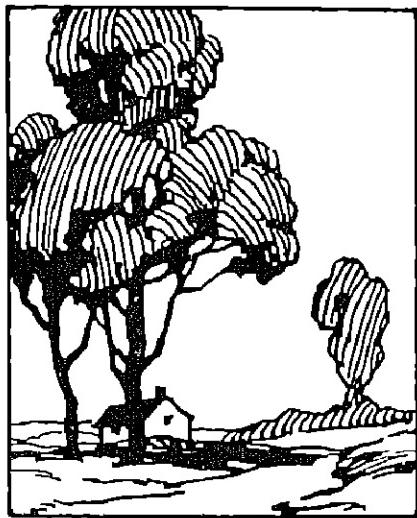
One such example is enough to show the need which exists for the teaching of design



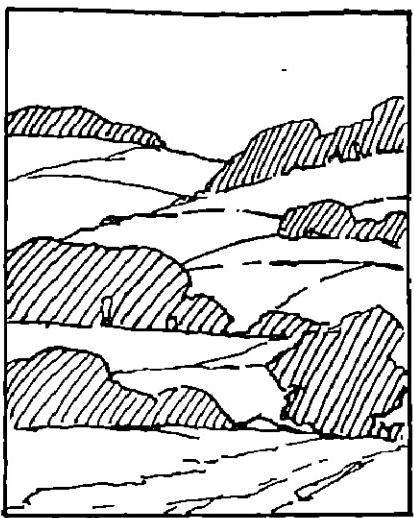
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PLATE XVI
DOMINANCE IN PICTORIAL DESIGN

as being something more than a mere repetition of formal units.—

Proportion and dominance in craft designs.—These elements apply with equal importance to any suggestions for craft projects which may be drawn in the art room. And this is where the true correlation between the art and craft work should operate. The art teacher should have the opportunity to discuss the principles of design involved in any piece of work with the crafts teacher with whom lies the responsibility for the workmanship, but it certainly does not follow that the crafts teacher should be expected to carry out a design made by anyone having no knowledge of the material or the processes that it involves. Collaboration requires knowledge upon both sides.

Figs. 2, 3 and 4 (Plate XVII) show the corresponding fault in craft design to that of Fig. 4 (Plate XVI) in pictorial design. The main proportions are unvaried as between the parts, which causes a lack of interest due to the loss of the dominant feature in each case. Figs. 2A, 3A, 4A and 5 (Plate XVII) show how this fault may be remedied by adjusting the proportions between the parts without altering the essential dimensions of the article. Figs. 1 and 1A show how the same principle is applied to framings having a series of parallel lines.

Dominance by mass and line direction.—Fig. 1 (Plate XVI) shows dominance by mass and line direction in a common type of pictorial subject. In colour the mountain mass would be treated as an almost flat tonal area, thereby enhancing the effect of size and distance in addition to its being the largest unbroken area in the landscape. If it were to be broken up by too much detail, that effect would be lost. Also, however large the number of individual hues to be used, the whole picture should be resolved roughly into the same three general tone values as are indicated in the diagram. The line direction of the mass outline leads the eye upwards, retaining the impression of height for distance.

Dominance by contrast of tone.—Fig. 2 (Plate XVI) illustrates dominance obtained by sharp contrast of tone in addition to line direction. The relatively small area of intensely contrasted tone in the face becomes dominant by that intensity or "highness of key," and is accentuated as the centre of interest by the convergence to it of the outlines of the dark masses. To retain the importance of the light area the balancing areas of the same tone value are kept smaller in size. Here again, however great the number of hues or the amount of detail included in the background and figure, the three general tone values should be preserved, for otherwise the scattered and "spotty" effect will spoil the contrast.

Dominance by position.—Fig. 3 (Plate XVI) shows dominance by mass as in Fig. 1, and also by the normal use of perspective, thus bringing the nearest trees into the position of greatest importance. At the same position in the picture they are made to unite with the centre of interest—the cottage so that this area becomes the dominant one in the arrangement and the attention of the observer is not drawn away to another part. In a colour representation of this picture the cottage wall would probably be by far the lightest tone or highest key—which would assist in centring the interest at this point. The sky, distance and foreground would then be lower in tone, or darker, than the wall, to the varying degree necessary for the completion of the picture.

It should be understood that these are only simple examples of typical pictorial arrangements, and that similar effects might be got in each case by reversing the tonal scheme, as for different lighting, whilst an infinite variation of hue is possible for the colour scheme of each picture.

In Fig. 4 (Plate XVI) there may be a great variety of hue in use, but there is a lack of dominance. The repetition of forms of similar size, shape and tone value prevents dominance by mass, whilst this absence of contrast, combined with the number of "sympathetic" lines, causes the eye to be

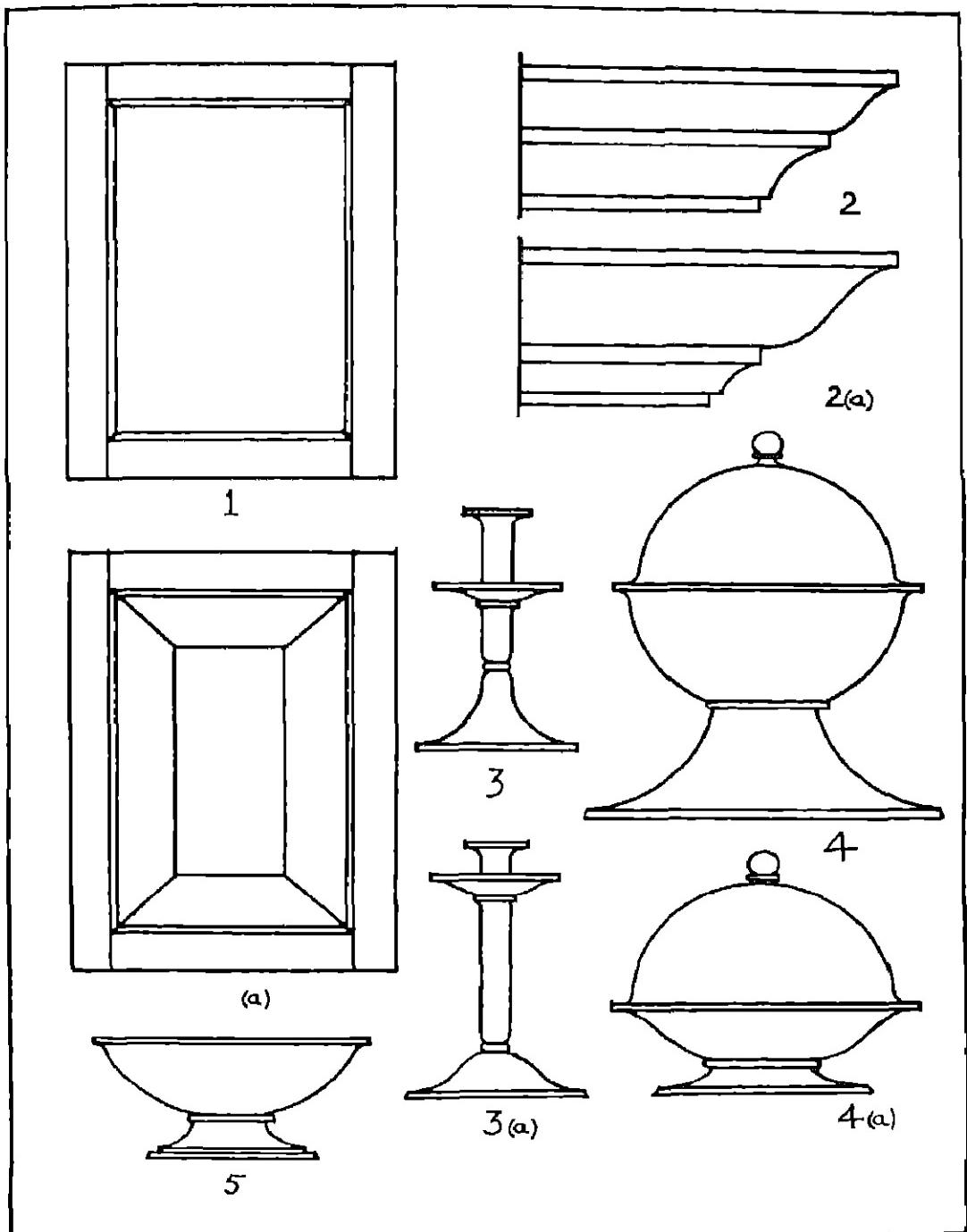


PLATE XVII
DOMINANCE IN CRAFT DESIGN

led aimlessly in and out of the picture without its being able to settle upon any centre of interest. There is, in fact, no such interest, and this diagram shows the cause of failure in so many drawings by older children. It resembles a photograph carefully taken from an ordinary view point without any selection of the material of pictorial interest.

The centre of interest.—This should be present in every arranged composition or design. There are a number of ways in which it may be ensured, of which one has already been mentioned in connection with Fig. 3 (Plate XVI).

The commonest way is to arrange the main lines of the picture so that they "lead in" to the centre of interest. This may be done directly, as in Fig. 2, by the outlines of sharply contrasted tones which converge upon the "centre," which, incidentally, should not be in the geometric centre of the picture. Or it may be done indirectly by the use of such elements as the edges of a cloud or a bank of trees; the slope of a path; the position of a figure, so arranged that the eye of the observer is carried from one form to another, in a rhythmic manner, until the centre of interest is reached quite naturally and even unwittingly. As has been mentioned above, such planning is assisted by the contrast of tone values or of hue intensity.

Subordination.—This is the converse of dominance, which it assists, as shown in Fig. 2 (Plate XVI). The repeated and balancing area of lightest tone value, the hand, is subordinated to the main area by being placed out of the centre of interest and by being made smaller in size than the main area. The commonest form taken by "subordination" is that of reduction of size of mass in all except the main area of interest. This is demonstrated in Fig. 1, and in Fig. 3 by the smaller tree form in the middle distance.

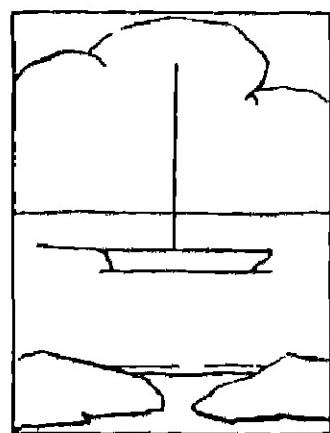
Proportion.—In pictorial design this is bound up with all the other elements, to

each of which it is directly related. It is another name for variety, upon the presence of which depends the interest of a picture. Fig. 1 (Plate XVIII) shows the commonest faults in children's imaginative drawings, due to their natural inability to understand how to place their material inside a rectangle. The chief fault is lack of variety in the arrangement of the main lines. The horizon line cuts the drawing into two equal parts horizontally. The mast of the ship cuts it into two equal parts vertically; and the fact that this line does not extend from the top to the bottom of the picture does not alter its effectiveness as a centre line. Having placed the main object of interest dead in the centre of the picture, the child naturally feels the "emptiness" of the composition and tries to rectify this by "filling in" one of the bottom corners, as shown. This makes things worse still, so that he repeats the shape in the opposite corner. The sky now looks empty, and a cloud is placed in the middle, over the top of the mast; but as it appears to be impaled upon the mast he extends the cloud by two lines of equal length and curvature to join up with the edges of the picture.

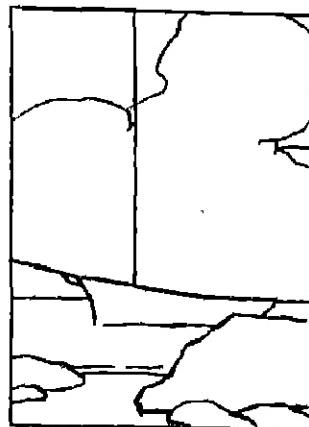
This is not an exaggerated description; it is what happens in every imaginative drawing lesson. The resulting picture is monotonous and uninteresting because of the absence of variety and because it forms a poor pattern. The lines of the ship do not link up with the edges of the picture, consequently the uninterrupted areas of the background are too large.

Unequal proportion, or variety, is applied to the same subject in Fig. 2 (Plate XVIII) which demonstrates clearly the added interest that is obtained by making a varied pattern of the areas of background and the shapes which are placed upon them. The diagram shows the varying proportions of these areas; the varying distances between the main lines, and how the main lines are linked up with the edges of the picture's "frame."

If the main lines of the diagram (Fig. 4,



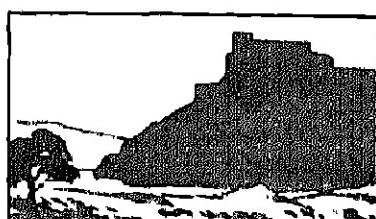
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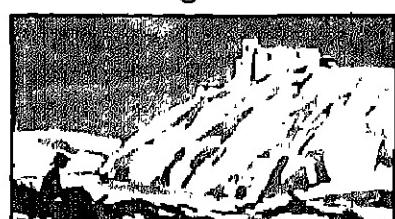
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VARIOUS SIMPLE WAYS OF
OBTAINING BOTH DIRECT
AND INDIRECT BALANCE

Plate XX) are simplified still more into an arrangement of horizontal and vertical lines, it will be noticed that the same principle of variety of spacing decides the placing of the trees and of the line of the landscape. It is this main-line planning of the picture that is so important in school work, for no amount of intricate detail will make a good picture if it is badly arranged as regards these lines.

The same principle holds good in craft work, as shown by comparison between Fig. 1 and Fig. 2 and between Fig. 3 and Fig. 4 (Plate XIX).

Balance.—This most important element of design is present in one or more of its various forms in every successful design, pictorial or otherwise. It may be direct or indirect in its form.

Direct balance is obtained by repetition in a smaller degree of any particular shape, tone value or hue which occurs in one part of a design, in another part of the same design. An extreme case of formal or direct balance about a vertical axis is shown by the poor design of Fig. 1 (Plate XVIII) already mentioned. Normal balance, by repetition, is shown in Figs. 2 and 3 (Plate XVI); Figs. 4 and 5 (Plate XVIII) and Fig. 4 (Plate XX).

Indirect balance is obtained by a compensating arrangement of tone values or hues. For instance, a small area of intense hue such as pure orange in one part of a picture might be balanced by a much larger area of greyed tint, tending towards blue-green in another part of the design. Fig. 6 (Plate XVIII) illustrates this in diagrammatic form.

A converse tonal arrangement of the same principle is shown in Fig. 7 (Plate XVIII). Fig. 3 (Plate XVIII) on the other hand, shows the same subject as an unbalanced design in which the fault is made obvious at once.

Counterchange.—This is a form of direct balance which is very common in all-over

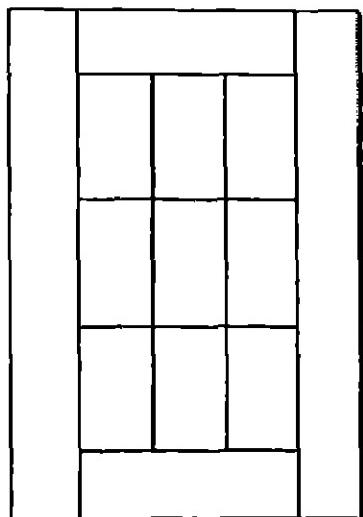
patterns in black-and-white. However, it is a very useful form for pictorial work and it adds brightness to the design. The principle involved is that the darks "cut in" to the lights, and *vice versa*, as shown very simply in Fig. 5 (Plate XVIII). It has the great advantage as a method of breaking up long and uninteresting lines which tend to cut the picture into pieces. The French painter Manet was a master of the use of counterchange in painting.

That form of direct balance known as the "balance of the steelyard" is used in all kinds of design. A pictorial example occurs in Fig. 3 (Plate XVI) in which the end of the cottage represents the fulcrum. The large mass, corresponding to the heavier weight, is placed close to this "fulcrum," whilst the smaller mass of trees or other detail is placed at a greater distance from it, as in the case of the lighter weight on the arm of the steelyard.

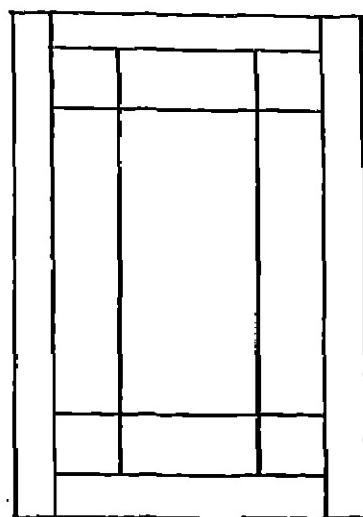
A simple illustration of its use in another way is given in Fig. 5A (Plate XIX). The balancing point, or fulcrum, is the small triangular ornamentation just underneath the larger block of lettering composed of the title of the book and of the author's name. At a considerable distance away from this point, lower down the page, is placed the smaller block of lettering. All the lettering is placed upon the page with the greatest regard for the varying widths of the margins.

Fig. 5B (Plate XIX) shows a common method of arranging book-cover labels and title pages which makes use of the principle of direct balance, exactly as in Fig. 2 (Plate XVI) and Fig. 4 (Plate XVIII). Thus it will be seen that two methods of obtaining balance are combined in Figs. 6 and 7 (Plate XVIII). Both direct balance by position and indirect balance by contrasting tone values are used in the same examples.

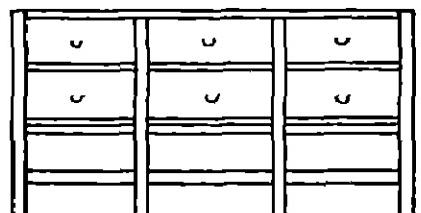
Transition, opposition and rhythm.—These three important elements, concerned mainly with the study of line direction, occur in conjunction with those already mentioned



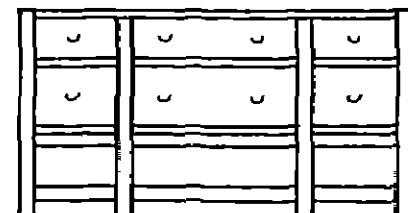
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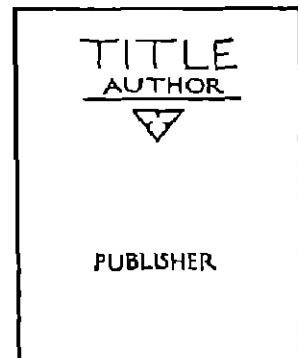
2



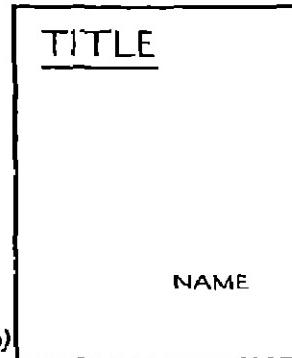
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4



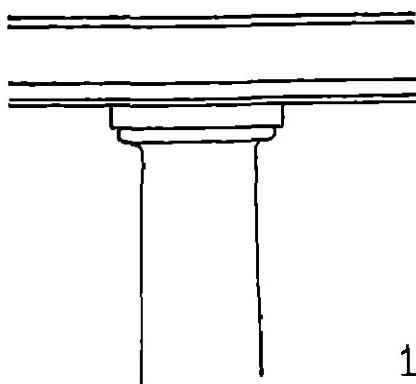
5(a)



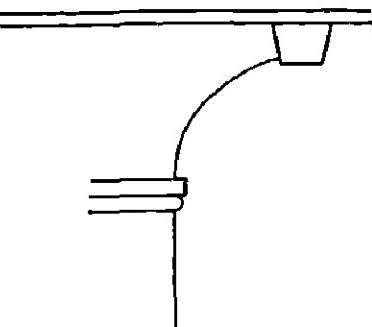
5(b)

PLATE XIX

OPPOSITION AND BALANCE IN CRAFT DESIGN

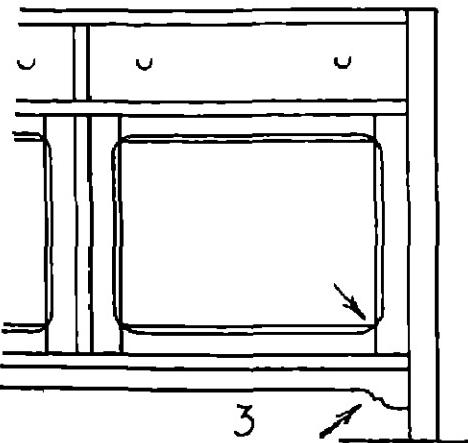


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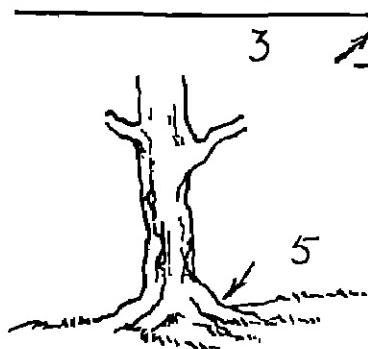


2

EXAMPLES OF TRANSITION



4



5



6

PLATE XX
TRANSITION IN PICTORIAL AND CRAFT DESIGN



FIG. 1. RHYTHM IN PICTORIAL DESIGN

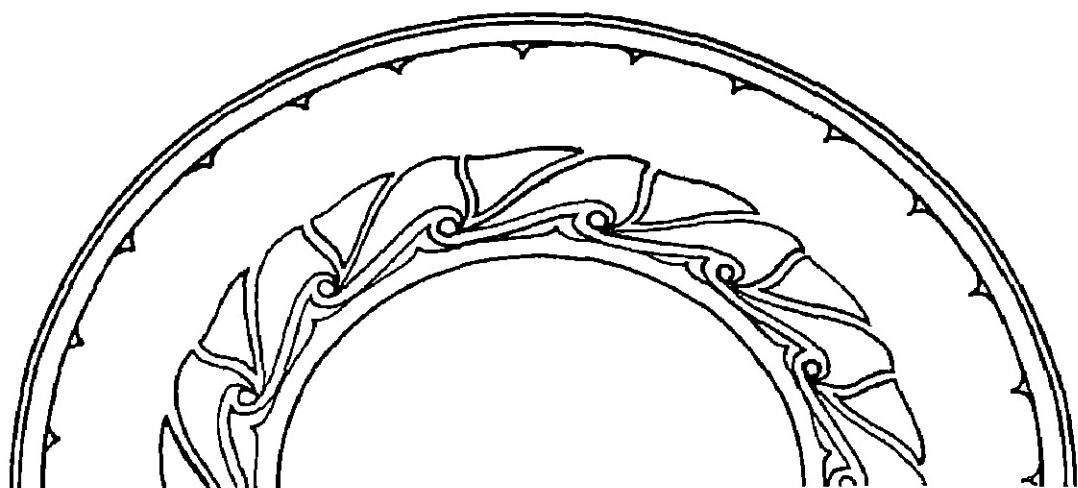


FIG. 2. RHYTHM IN CRAFT DESIGN

PLATE XXI

RHYTHM



[Reproduced by courtesy of Iain Macnab and "The Artist."
PLATE XXII
RECLINING FIGURE]

in every finished design, whether it is pictorial or otherwise.

Fig. 1 (Plate XVII) and Figs. 1, 2, 3 and 4 (Plate XIX) show opposition of the structural lines in woodwork in which there is no softening influence whatsoever.

Whereas such rigidity of design is desirable in craftwork so that the impression of strength and solidity may be retained, it would be unnecessarily harsh in pictorial work in ordinary circumstances. Vertical and horizontal lines which cross or which

meet are most valuable for conveying this sense of stability and strength pictorially, but they exert their greatest influence in architectural design.

In pictorial work the lines need not be straight in the geometric sense of the word. They are straight and at right angles in general direction and in feeling. Fig. 3 (Plate XVI) and Fig. 4 (Plate XX) demonstrate this principle in use, the line direction of the tree trunks and of the ship's mast (Fig. 2, Plate XVIII) opposing that of the horizontal

and sympathetic lines of the lower parts of the diagrams.

Transition is the softening element which is introduced into an opposing line design to carry the eye easily from one direction round to another direction which may or may not be at right angles to the first. In Fig. 3 (Plate XVI) the cottage unit serves this purpose by interposing an actual form at the point of "collision" between the opposing lines. In Fig. 4 (Plate XX) the transition is got by the outward spreading of the branches and



From the aquatint by W. Lee-Hankey

[Reproduced by courtesy of "The Artist."]

PLATE XXIII
THE FLIGHT FROM BELGIUM

twigs from the tree trunks to meet the top edge of the picture. Fig. 6 (Plate XX) shows transition from one edge of the picture to another to such an extent that the bounding edges of this diagram could not be lengthened without upsetting the whole design.

In all these diagrams it is clearly shown that the design must be composed within the particular border lines that are chosen. This fact is ignored to such an extent in the teaching of pictorial design that as a rule it is only by sheer luck that a pleasing arrangement can be got in a child's drawing. It is for this reason that these various elements are being stressed at this stage, in the hope that teachers will endeavour to get some order and arrangement into the earlier work of the children.

Other examples of transition are shown in Fig. 3 (Plate XVII) and Fig. 3 (Plate XX) as they apply in woodwork. Figs. 1 and 2 (Plate XX) show common applications to architectural forms, and Fig. 5 illustrates a case of transition as it occurs in natural forms.

Great importance is attached to this study of line direction because of the different pictorial qualities possessed by vertical and horizontal lines. Vertical lines are dynamic in effect, suggesting upward growth and movement. Horizontal lines are symptomatic of rest and quietude; they are essentially

static in character and should be employed when it is required to express this feeling.

Curved lines are suggestive of movement, and *rhythm* is the term given to the sense of harmonious movement which may pervade a composition or a design for craftwork. Fig. 6 (Plate XX) and Fig. 1 (Plate XXI) show rhythmic arrangements obtained by actual, or suggested, line direction. Fig. 2 (Plate XXI) shows the use of abstract forms in a rhythmic design for a beaten copper plate.

Two examples of the importance of these principles of design are given in Plates XXII and XXIII. Plate XXII is a fine specimen of rhythmic composition. Plate XXIII shows the impressive effect gained by the use of a dominant mass which is itself broken up into related tone values.

Harmony and contrast.—These have already been considered in relation to line direction and the quality of tone values. Further reference will be made to them in connection with the use of colour.

It is hoped that the later pages of this article will show very clearly how the illustration work of the senior children is greatly improved by the teaching of these elements of design. The final results are the justification for the inclusion of expression drawing in the junior stages of the school course.

FIRST YEAR

IMAGINATIVE DRAWING AND ILLUSTRATION

Subjects.—A certain number of these should be set by the teacher to be carried out at a prearranged period. The children should be encouraged to study the material for the subject beforehand, making full use of their sketch books for this purpose and in their own time. The material gained in

this way, and the knowledge gained by its collection, should be used at the time of the lesson, so that the sketch books become a reference library. The lesson consists of an exercise in the rearrangement of the material which has been gathered to form an otherwise original drawing. This help, combined with that which is given by the teacher, enables the children to gain confidence in themselves and in their work.

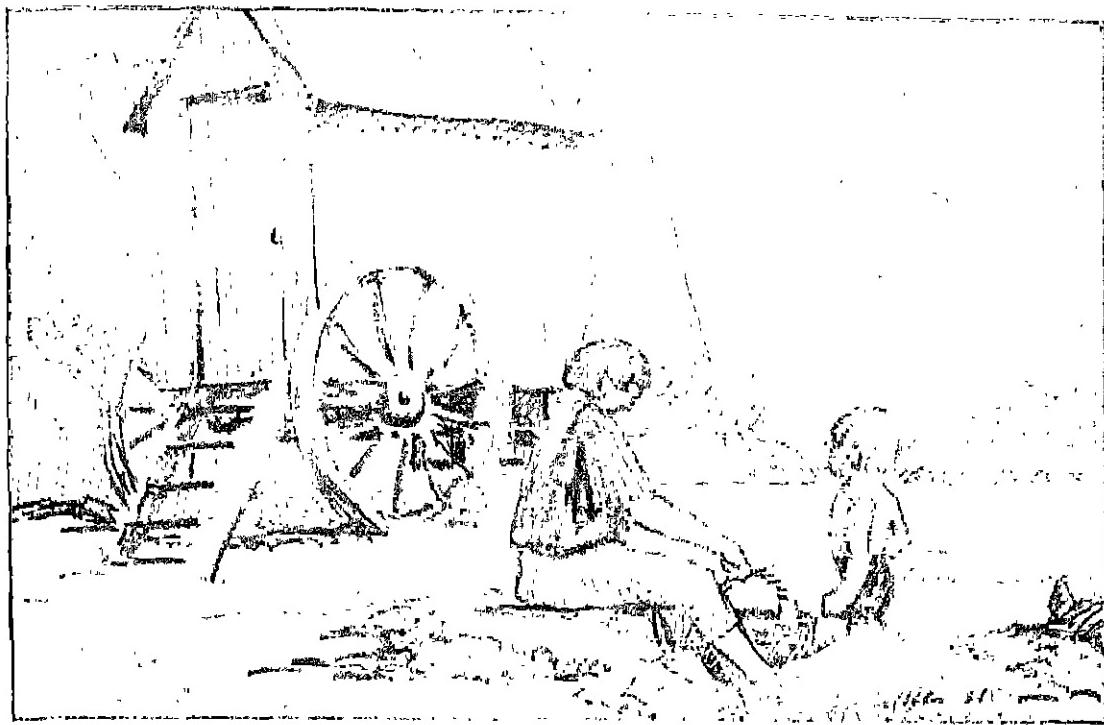


FIG. 1

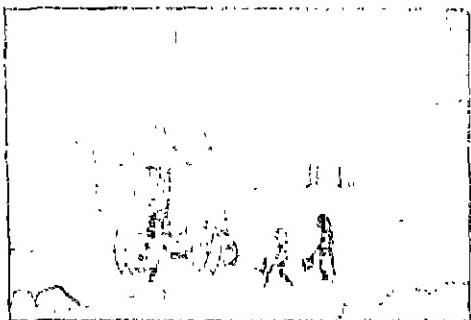


FIG. 2

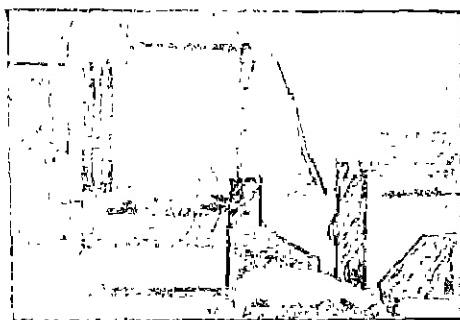


FIG. 3

PLATE XXIV

THE STAGES OF PROGRESS FROM THE FREE EXPRESSION DRAWING TO THE FINAL COMPOSITION

Other subjects should be set at the time of the lesson, so that they train the children in pure memory drawing. Yet others should be suggested by the children themselves, for both methods.

Suitable subjects will include the illustration of stories, outdoor and street scenes, scenes from school plays, sporting events,

subjects in the home, animals, ships and vehicles. The human figure will play a large part in most of the drawings and its introduction should be encouraged as much as possible. Many of the children are still in the transition stage between symbolism and realism, and they will need plenty of practice and encouragement in the drawing

50 TEACHING IN PRACTICE FOR SENIORS

of figures at rest or in movement. Criticism should be helpful and kindly at this stage.

Method.—As the lessons are of short duration, the method of procedure should be decided upon beforehand.

For a set subject, such as *The Seaside*, the children should draw a small rectangle to the same scale as that of the final drawing. This should be done on scrap paper and in it should be put all the details which they propose to use for the illustration. These should be sketched in very roughly indeed, but the main lines should be linked up with the edges of the picture area, as in Fig. 2, Plate XXIV. Children are more easily able to plan their drawings on a small scale at first.

The lights and darks should be shaded in very roughly also, and rearranged to give an idea of the pattern of the picture, as in Fig. 3, Plate XXIV.

When the arrangement appears to be satisfactory the final drawing is begun as freely as possible and with the brush alone if the subject is a suitable one for direct painting. "Squaring up" the sketch and the final drawing should never be done for this kind of work; it is necessary only for large wall panels and similar projects which require the exact reproduction, on a larger scale, of a carefully drawn cartoon.

Fig. 1 (Plate XXIV) shows the final form of the illustration produced by this method, which enables the teacher to deal with any particular points in the children's drawings which need alteration before the final attempt is made. If several such points arise, a lesson on them should be given with backward sketches whilst the children take notes.

Fig. 1 (Plate XXV) shows a subject illustration drawn in a natural manner by a child who has had no guidance whatsoever as to the arranging of the material in the picture. The most important item was drawn separately and at first, in the centre of the picture. This was followed by less important details (to him) of background,

etc. Other forms and odd lines were introduced to "fill up" the vacant spaces afterwards, so that the whole drawing lacks the attractiveness and quality that it should have, although it may be very freely handled; it is comparatively well drawn and fresh in colour.

Another important principle is demonstrated very clearly in this drawing. The line representing the right-hand edge of the road, and the hedge, enters the picture on the right-hand side towards the top of the picture and leaves it at the bottom edge near the left-hand corner without a single break in its continuity. In effect it cuts off nearly one-third of the picture without being linked to, or being broken by, any other form. This line is, therefore, harsh and ugly in appearance, and it destroys the unity of the picture by its isolation from the other forms. All that is necessary is that the children should be shown a similar example on the blackboard, and that they should be told to "break" such lines when they occur—not always by introducing other forms, but by enlarging forms which are already there, or by altering their position.

Figs. 2 and 3 (Plate XXV) show illustrations which are quite good in themselves but which suffer from the same faults.

Fig. 4 (Plate XXV) gives evidence of much more careful planning, although the details are crudely drawn. But the whole of the picture area has been used, in this case to better effect.

The charcoal drawing shown in Plate XXVI is remarkable for the manner in which the sense of drama and movement, suggested by the subject, *The Shipwreck*, has been achieved by a few strong, main lines. The treatment is unusual, but it does give the impression of the huge waves and deep troughs; the angry sky; the plight of the wrecked ship, and the futile attempt to launch a boat which is shown in the act of being overturned by the seas. The style of drawing is reminiscent of the work of Van Gogh, and it is quite possible that

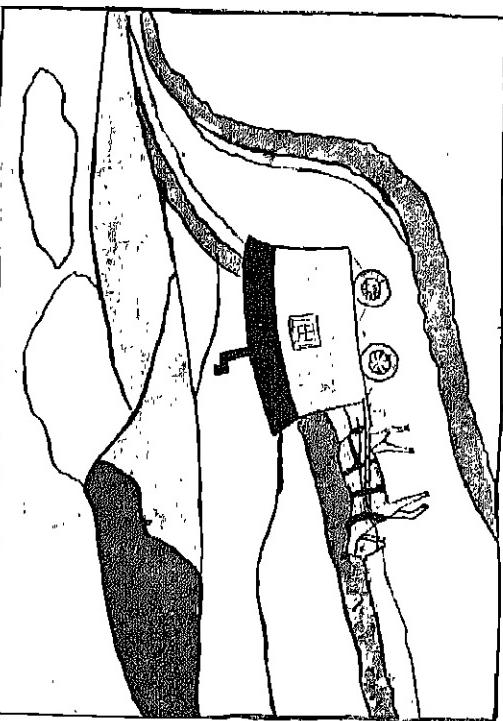


FIG. 1

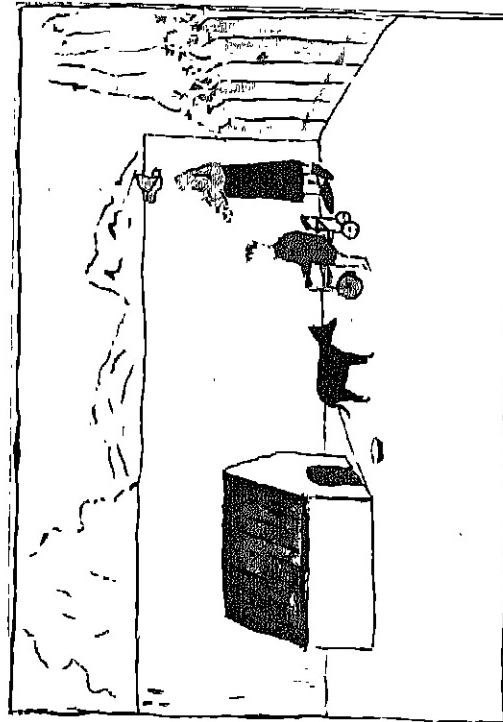


FIG. 2

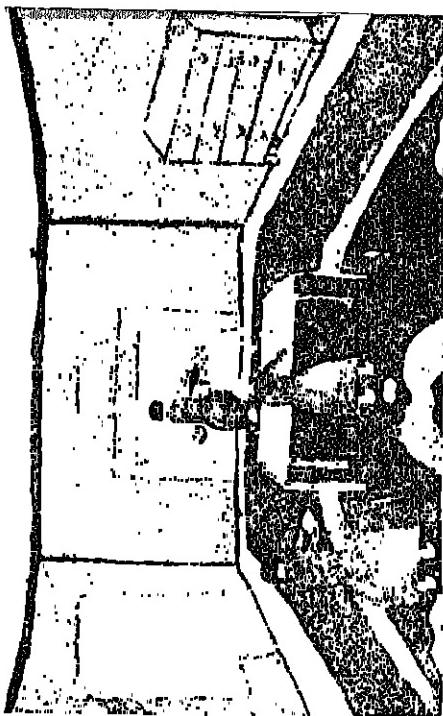


FIG. 3

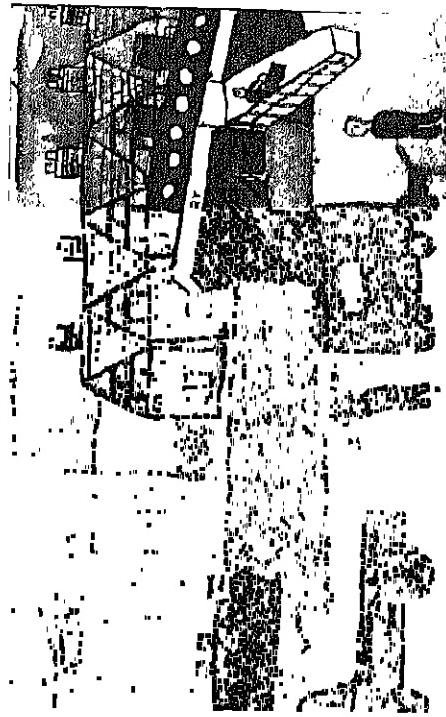


FIG. 4

PLATE XXXV
FREE ILLUSTRATIONS SHOWING THE NEED FOR ORDERED RE-ARRANGEMENT OR "COMPOSITION"

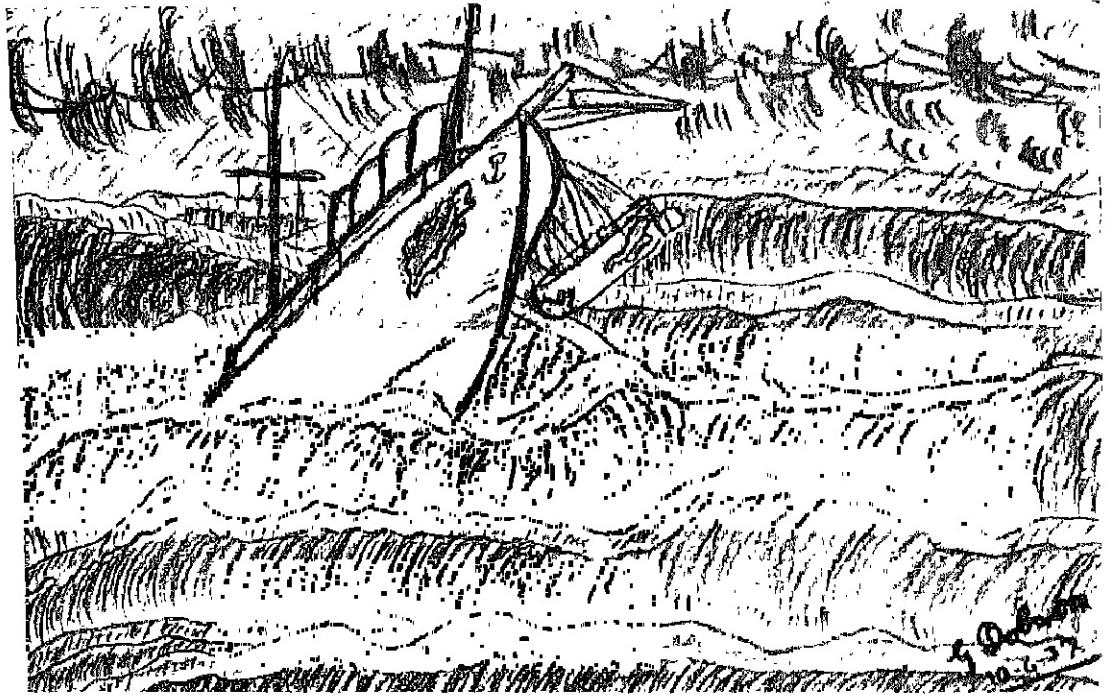


FIG. 1. "THE SHIPWRECK"—A VIGOROUS BUT UNTUTORED DRAWING SHOWING THE CHILD'S NATURAL SENSE OF DRAMATIC PRESENTATION



FIG. 2. A TREE ILLUSTRATION FOR "GNOMES IN THE MOONLIGHT" SHOWING SYMBOLICAL TREATMENT OF THE MOONBEAMS IN THE WOOD
PLATE XXVI

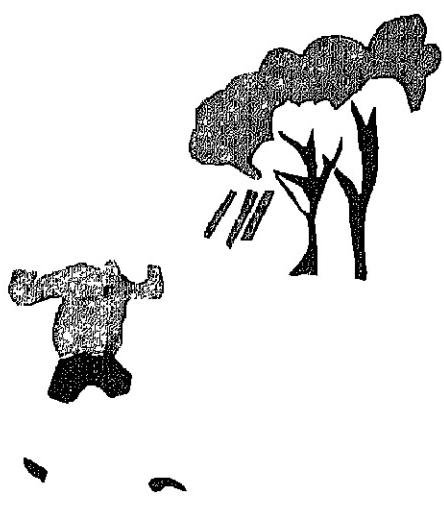


FIG. 1

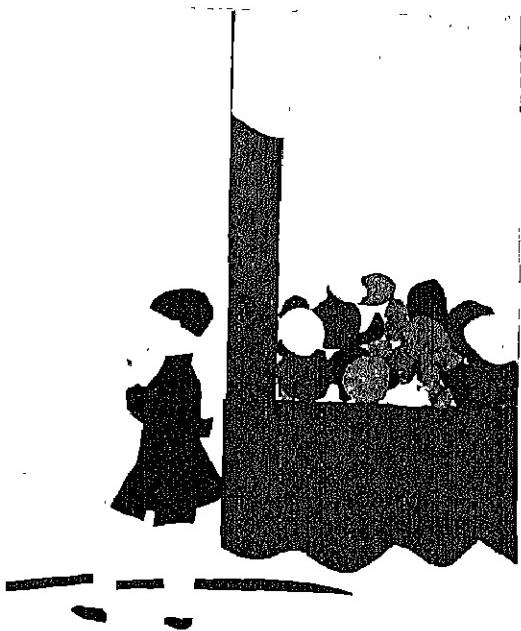


FIG. 2



FIG. 3



FIG. 4

PLATE XXVII
CUT-PAPER ILLUSTRATIONS

an example of the virile technique of that master has been seen by the child and that by its very unusualness it has left a lasting impression upon his mind.

Fig. 2 (Plate XXVI) illustrates a child's conception of gnomes dancing in a wood in the moonlight. It has an amusing and whimsical "feeling" for a difficult subject, along with some good drawing and painting. The arrangement is obviously weak, but this is compensated for by the essentially practical interpretation of the moonlight—which is represented as a kind of searchlight beam or spotlight. It will be noticed that the localised effect of such a beam on the ground level is a problem which is far beyond his power of memorising, and he shows its relationship to the surroundings in a diagrammatic manner; that is, symbolically.

Figs. 1 and 2 (Plate XXVII) gives two examples of cut-paper work in which the aim is to reduce the forms to their simplest expression, with a minimum of detail. Training in this work is of the greatest value as a preparation for the later attempts at poster designing. Also, it provides an opportunity for the first simple colour arrangements in the "flat."

In Figs. 3 and 4 (Plate XXVII) the work is carried to a slightly more detailed stage in coloured paper. Even at this early stage the children begin to appreciate the difference between the decorative treatment by this medium and the realistic treatment of their ordinary drawings.

Treatment.—The drawings should be done on sheets of paper of at least $\frac{1}{4}$ Imperial size. Nothing smaller should be permitted for illustration work, as the children should keep away from the drawing—almost at arm's length. This will enable them to draw and to paint freely, and to see their pictures as a whole instead of concentrating upon one small part at a time.

The children should be instructed to think about the colours which they are using and to try them out on paper before applying them to the final painting. The notes made

during the lessons on colour should be used in the imaginative drawing and painting lessons.

All this work should be as bold as possible in execution, and to help in attaining this end the brushes used should be large. The long-handled hoghair brushes are the most useful, in both the round and flat shapes. Tempera powder colours are the best for this work and they are preferable to ordinary water colours.

PATTERN DESIGN

Media.—Positive and negative stencil plates for edge-stencilling (Plate XXVIII, top diagram); ordinary small stencil plates for patterns, such as those shown in the second diagram, and pieces of linoleum mounted on wood or corks similar to those shown in the bottom diagram. Ordinary students' quality water colours. Gloy paste. Flat hoghair brushes about $\frac{3}{4}$ in. wide. A fairly thin, tough and absorbent paper with not too much "dress," but one which may safely be pasted on the reverse side from the pattern. These are the essentials for patterns which may be produced quickly and which may be applied to the craftwork exercises.

It is probable that stick-prints and potato-cut units have been used in the junior school for the introductory stages to all-over pattern design. They will not be used to any great extent in the senior school as they have certain disadvantages in comparison with stencilled and linoleum-cut units. The stick-printed pattern is very tedious to complete over a large area such as the endpapers for a book, and the type of pattern which is produced by this method is very formal. Very good patterns may be produced by the use of potato-cut units, but these cannot be kept for any length of time for future use.

Method.—There are four ways of reproducing a unit to give an all-over pattern, all

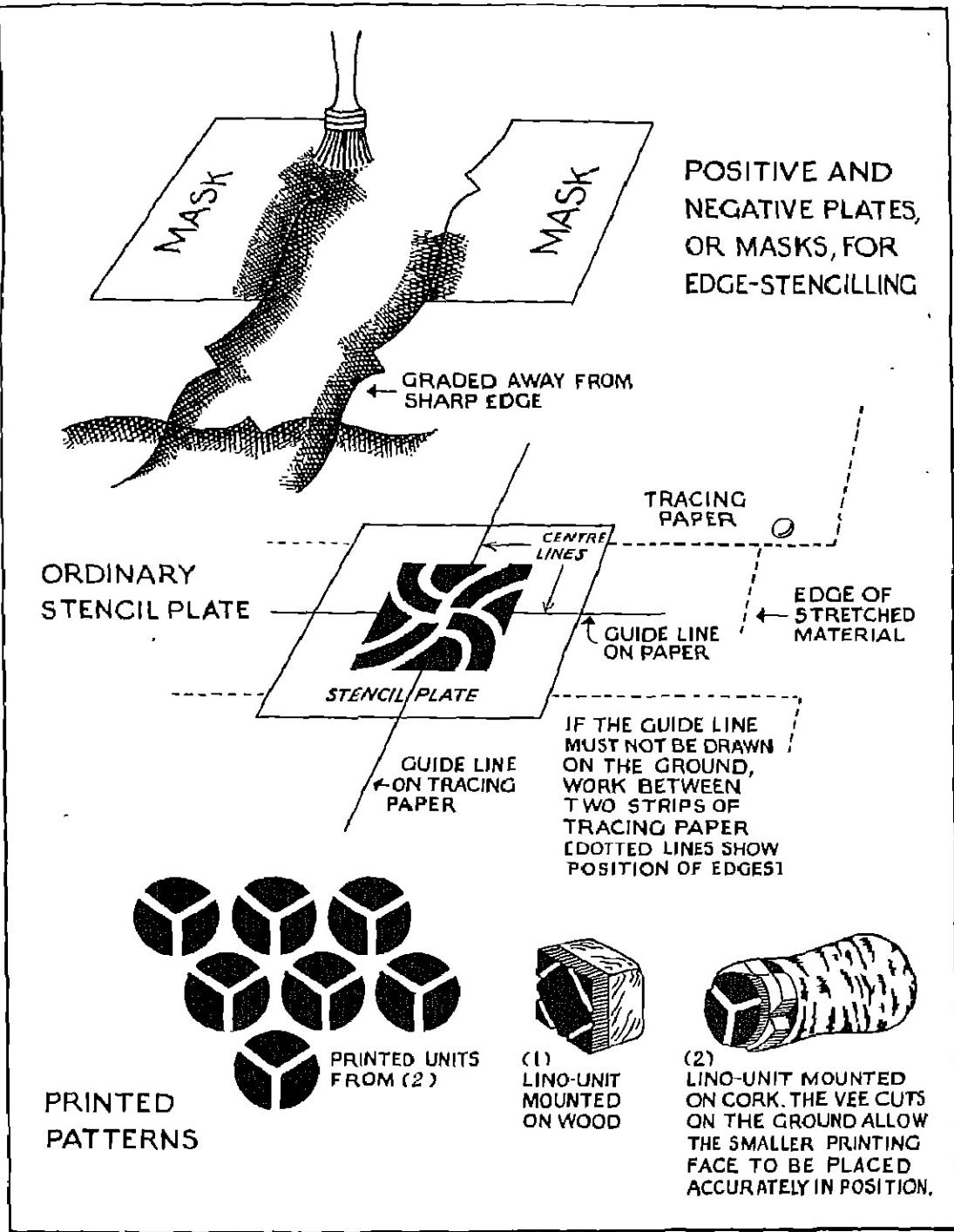


PLATE XXVIII
THREE METHODS OF PRINTING ALL-OVER PATTERNS

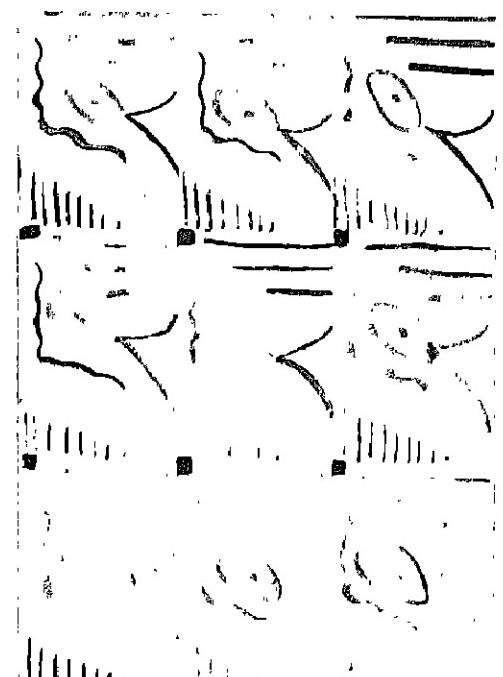
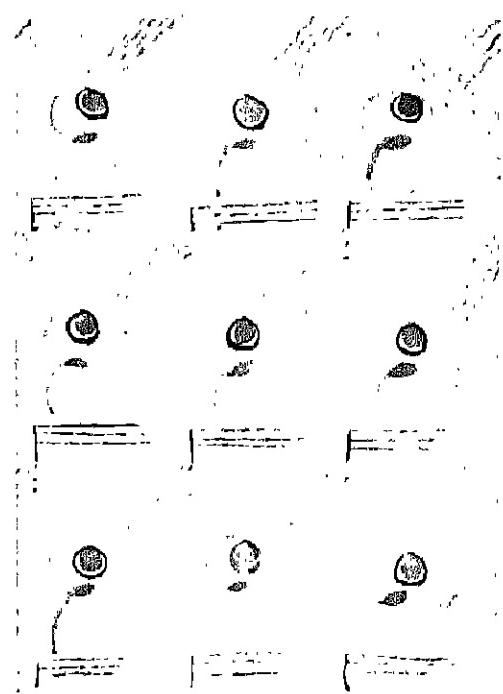
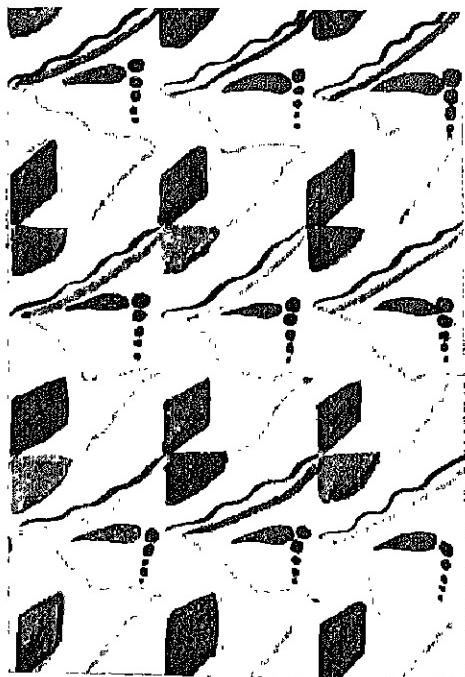
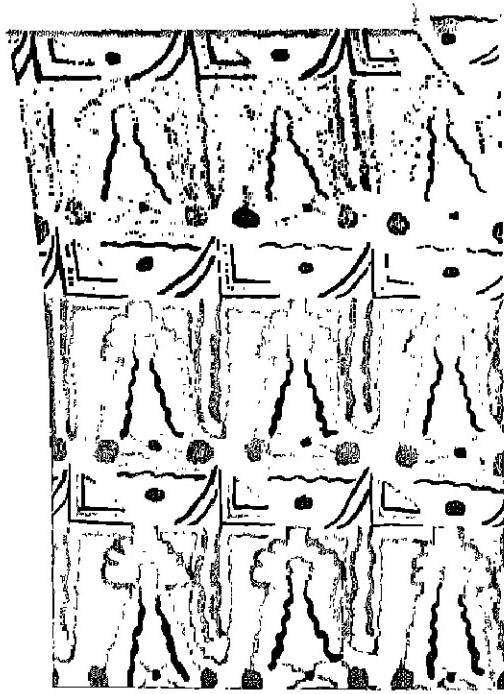


PLATE XXIX
BRUSH-DRAWN PATTERNS

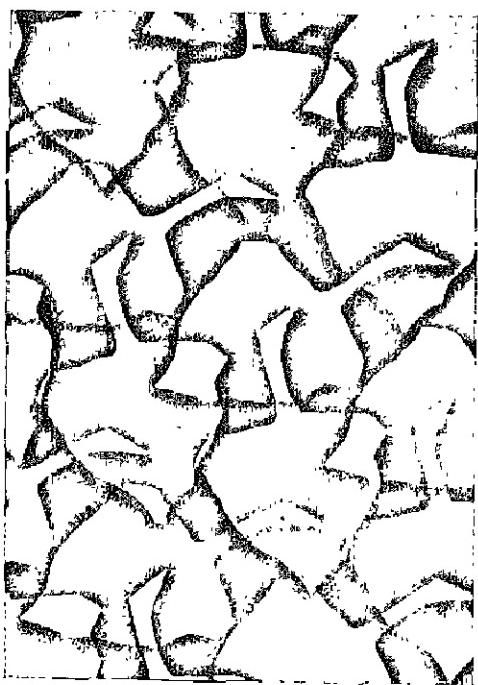
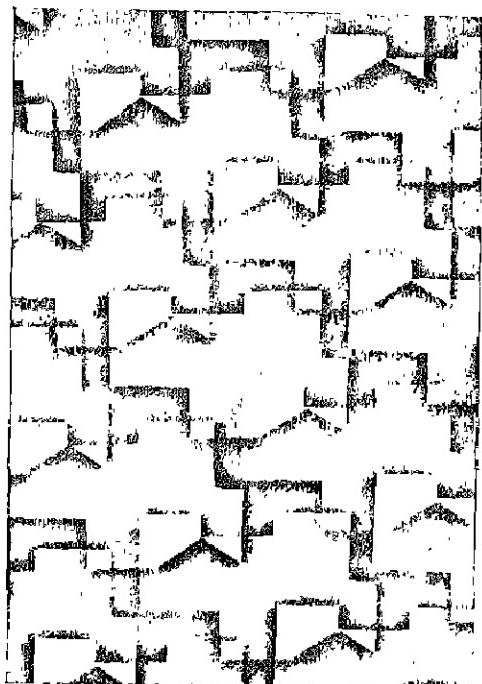
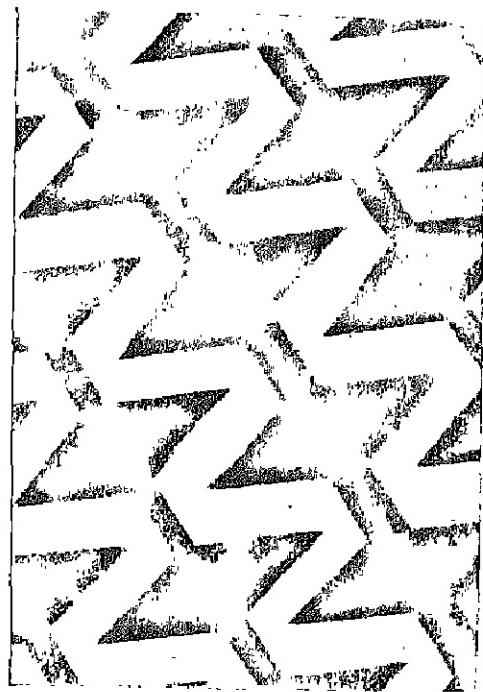


PLATE XXX
EDGE-STENCILLED PATTERNS

of which should be attempted by the children. The design may be drawn entirely with the brush, freehand and without any helping guide lines, using the brush strokes to form the units. This method gives exceedingly good practice in the preliminary brush-work necessary to painting and is becoming more popular in the junior school stages of pattern design. But its value should not be ignored in the senior school, and several examples of such pattern work are shown in Plate XXIX.

By the second method the patterns are stencilled, either along the edges of masks such as those shown on Plate XXVIII, top diagram, or through stencil plates as in the second diagram. The edge-stencil gives excellent patterns of a type that is most suitable for bookcrafts and the decoration of endpapers and covers. Its greatest value lies in the unexpectedness of the pattern that is made in this way, showing the child that the same unit may be made to produce a great number of different designs, each of which is "built up" in a way that could not be done by conceiving it as a whole and then drawing it in its finished form.

The mask is cut from a postcard or a piece of stencil paper which will not absorb the colour to any great extent and become sodden. The water colour, or oil colour, is used very sparingly on a stencil brush, which is kept nearly dry. Some practice is necessary to get an even gradation outwards from the edge of the mask as the line proceeds. Strong hues are not satisfactory for this work, which looks best when carried out in shades and tints on tinted or grey papers. The colours should be mixed beforehand, and water colour is best taken up from a soaked pad to get evenness of tone throughout the design. Oil colour may be rolled out on a marble slab or a sheet of plate glass, so that an even film of colour is available all the time.

Plate XXX shows examples of patterns produced by this means.

The ordinary stencil plate is more suitable for printing upon fabrics in fast dyes

or oil colour. This work is too advanced for first-year children and further reference will be made to it at a later stage in the course.

By the third method the pattern is printed from a wood or linoleum block. The waste material is cut away so that the unit shape is left on the face of the block. $\frac{1}{8}$ in. is sufficient for the depth of cut. The block is then mounted so that it may easily be handled, but its outer edges should be visible so that it may be placed accurately in position for each repeat.

The paper is ruled with finely drawn guide lines into squares, rectangles, triangles, etc., of the same size as the block. Better results will be obtained if the paper is slightly and evenly dampened before the printing begins.

To dampen the paper it is best to soak one sheet under the tap (not in a bath, in case there should be any grease or soap in it) and to place two dry sheets on top of the wet one; then another wet sheet and two more dry, and so on. Leave them under a light weight overnight, after which they will be flat and evenly dampened and ready for printing.

Method of printing.—It is strongly recommended that ivory black water colour should be used in preference to printer's ink for stick-prints, linoleum-block units and linoleum-block illustrations. The printer's ink is excellent if a dressed paper is used, and if there is a press at hand to give the necessary pressure for printing. But as these aids are not available in the average school the printing done with this ink is very seldom successful, the pull being smudgy and uneven in tone.

There is no reason why printer's ink should have to be used at all. The finest hand-printed blocks of the Japanese artists have been printed with black Chinese ink ground from the solid cake, with nothing more than a touch of rice-paste to act as a binding medium, and the ordinary ivory black water colour gives a rich velvety black print of a beautiful texture which cannot be obtained by the use of printer's ink. The damp

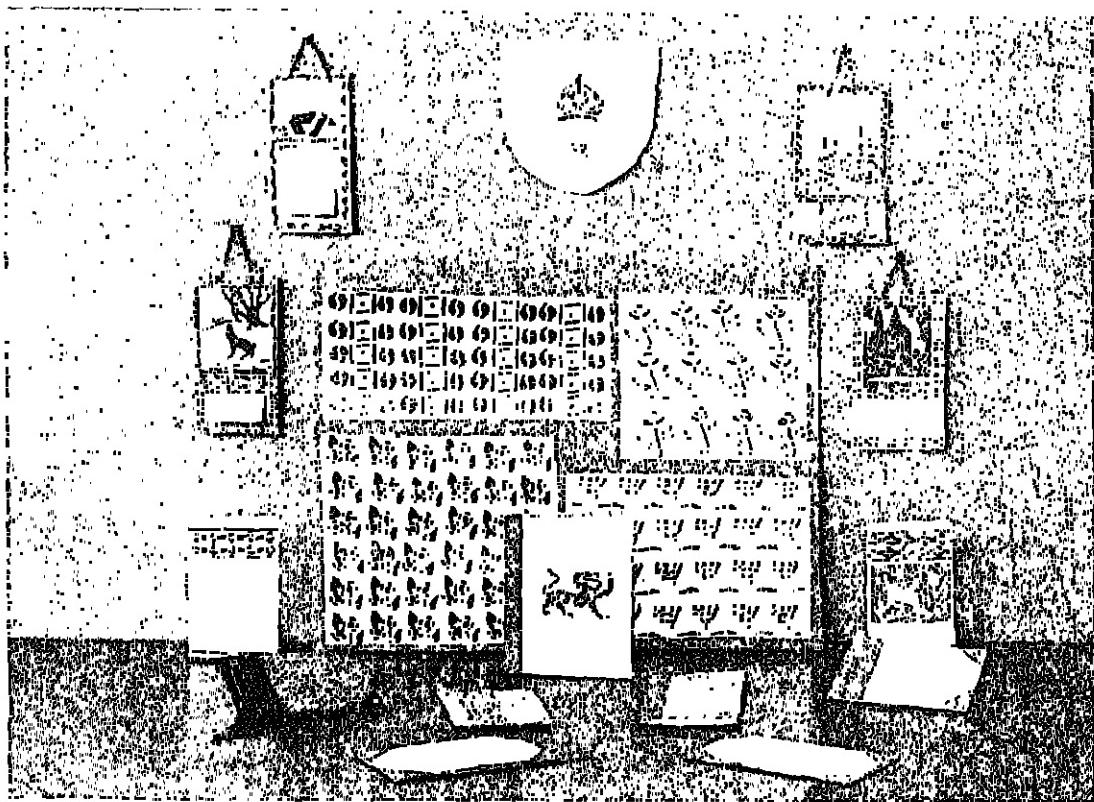


PLATE XXXI

ELEMENTARY BOOKCRAFT EXERCISES DECORATED BY LINOLEUM-BLOCK PRINTS, LINOLEUM-UNIT PATTERNS, STENCILLED AND STICK-PRINTED PATTERNS

paper absorbs much of the stiff colour, giving both this peculiar and beautiful texture with a satisfactory black. Another advantage which this method gives is the quickness with which the prints may be dried out, as they are put one on top of the other—again under a light weight—so that they dry flat and ready for inserting in a book or for mounting on a card. Printer's ink takes so long to dry that in the average schoolroom the prints become grimy and curled up before they can be mounted, and there is always present that unpleasant stickiness and smudginess on the surface of the print which will soil an adjacent page in a book. It is not suggested for one moment that these disadvantages exist when

facilities are available for the printing to be done properly; but they do exist when printer's ink is used by unskilled hands and without the proper apparatus. Children always put too much on the block, and use too much lithographic varnish or other medium.

Much of the surface texture and quality that is present in a Japanese print can be got by the use of water colours on cheap paper. For the best work in the third year the mulberry paper should be used, but it is not necessary at this stage.

Some ivory black is squeezed out on to a slab or into a saucer, and a little Gloy paste is placed near it. The brush, which must be a stiff one such as the $\frac{1}{4}$ in. flat

hoghair brush used for poster work, is rubbed into a little of the stiff colour straight from the tube so that only the end of the brush is charged. Then it is just touched in the Gloy, no water being added as the colour must be applied in a thin film which is at full strength. Watery colour "blobs" on the print and scrapes off against the edges of the block. The colour is mixed with paste by the action of brushing it over the block, the brush being held upright whilst the strokes are made firmly from side to side and then across at right angles. The block is now charged ready for printing.

It is left lying face upwards. The damp sheet of paper is held between the second finger and thumb of each hand at the bottom corners and is allowed to unroll on to the block, after which it must not be touched or moved sideways. To protect it, a dry sheet of cartridge paper is placed over the sheet on the block and the whole surface of

the block is gone over with the baren, the implement used for applying the pressure.

The genuine baren is an expensive item, and a good substitute is provided by the slightly curved base of a "Capstan" 1-oz. tobacco tin. This is rubbed with a firm pressure all over the area of the block, in a circular motion. The covering sheet is removed and then the print is peeled off the block and laid down face upwards.

The process is repeated for each print, and if too much colour has not been used the prints may be stacked in a pile without any "offsetting" from one to another. With practice, a batch of prints may be taken off at the rate of two a minute for a single block illustration.

The rate of printing units for an all-over pattern is much faster as the paper lies on a pad of newspaper whilst the stick, or unit, is held in the left hand and brushed with the right hand. Hand pressure is all that is needed.

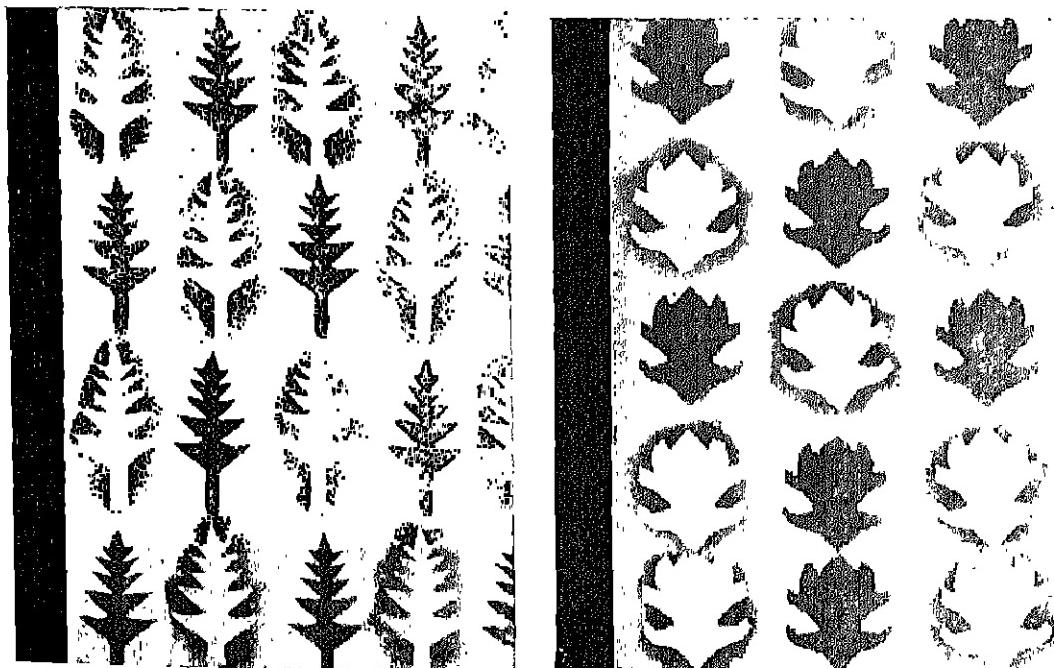


PLATE XXXII

FOLDER COVERS SHOWING THE USE OF POSITIVE AND NEGATIVE STENCIL-PLATES

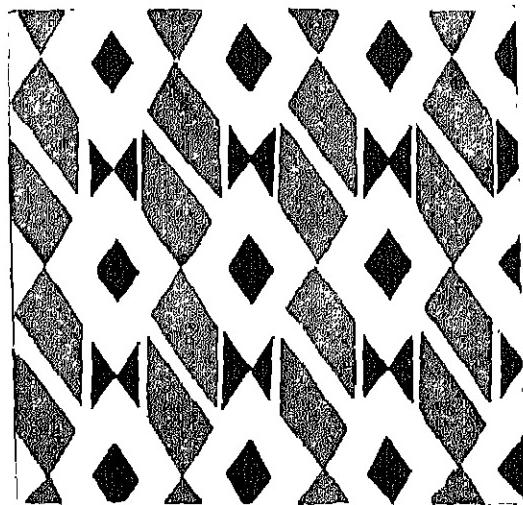


FIG. 1

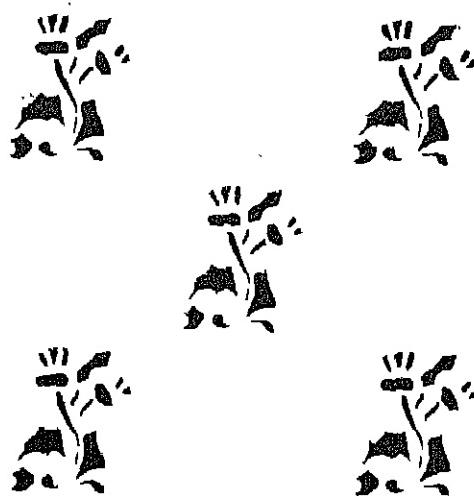


FIG. 2

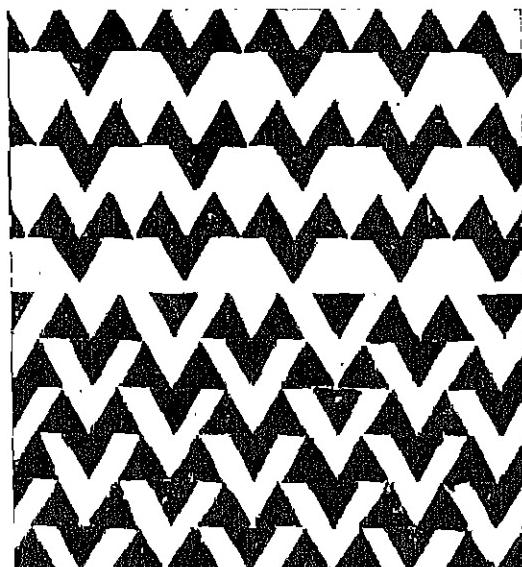


FIG. 3



FIG. 4

PLATE XXXIII
FOUR PATTERNS OF DIFFERENT TYPES PRODUCED BY VARIOUS METHODS

All the patterns and linoleum-block illustrations shown in these pages have been done by the above method, including the more advanced linoleum blocks in five and six colours. The means of "registering"

these for over-printing will be referred to later.

Plate XXXI shows a group of elementary bookcrafts exercises in which the patterns and illustrations have been printed in this

way. In Plate XXXII the patterns of folded covers have been reproduced.

Plate XXXIII illustrates three designs, simple patterns earned out in white ink on Fig. 1 is a check set pattern based on the diamond as a unit. It is built up of pieces of coloured paper, or can simply consist of a simple colour arrangement. The colours used in this are blue, red and black, set on a background of yellow (the yellow is the lures' tangle). The design of the tapestry carried out with different designs and colour schemes by individual children provides a permanent reference library of colour.

The second pattern, Fig. 2, is a check set pattern based on the square as a unit. It is built up of pieces of coloured paper, or can simply consist of a simple colour arrangement. The colours used in this are blue, red and black, set on a background of yellow (the yellow is the lures' tangle). The design of the tapestry carried out with different designs and colour schemes by individual children provides a permanent reference library of colour.

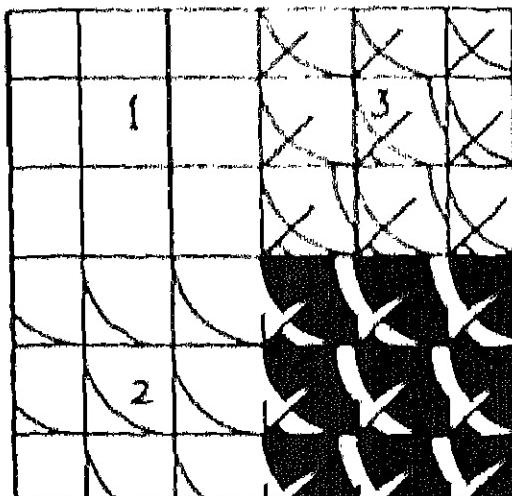
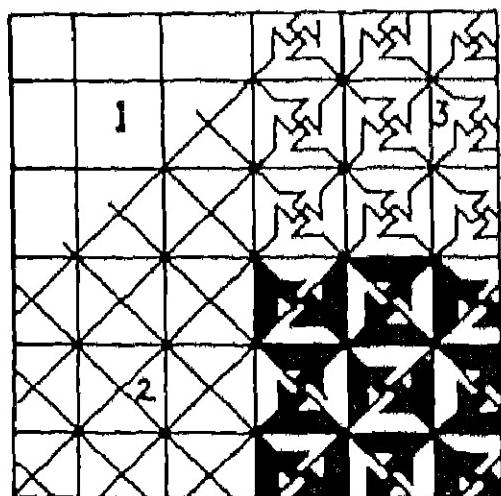


FIG. 1 AND FIG. 2
PATTERNS BASED ON THE DIAMOND AS A UNIT

ments of colour, any one of which may be used for an illustration or for a poster.

Fig. 2 is a widely spaced pattern intended for use on a larger sheet as an endpaper. The unit is a conventionalised natural form, cut in linoleum and printed as described above.

The two patterns shown in Fig. 3 are stick-printed by the same method. The triangle is the only unit to be used, and the children should experiment with single units such as the triangle, square and circle, both alone and combined, to produce more interesting patterns.

The third pattern, Fig. 4, is a check set pattern based on the square as a unit. It is built up of pieces of coloured paper, or can simply consist of a simple colour arrangement. The colours used in this are blue, red and black, set on a background of yellow (the yellow is the lures' tangle).

The place of pattern in the art course
The teaching of pattern can be approached in many ways. One way is to start with a wide range of patterns, and to let the children explore every place of interest in them. This is the traditional approach, and it is the most common type of the course of study.

The arrangement of a simple pattern is shown in Fig. 12, and a more elaborate pattern in Fig. 13, both of the application of patterns. It is the arrangement of patterns which is the main object of which we are at present engaged.

The first consideration of a pattern is how it can be used to advantage. If the pattern is to be applied to a book cover, it must be decided whether it will be suitable, or not, for the purpose, and the choice of pattern will depend upon the general style of the book. As the other part of the exercise is the colouring and arrangement of the pattern, the choice of pattern is not so important as the choice of colouring pattern.

For example, the pattern shown in Fig. 12, and known as "watered," is suitable for the colouring of a book cover. The pattern is a simple tracery, and the colour of pattern to be used is pale blue, with the highlights being white, and the shadows being dark blue. A good example of patterned paper is shown in the drawing given in Fig. 13, in which the pattern of the book is yellow. On the left of the pattern give a very simple part. It will be noticed that here both white highlights and the yellow of the top part of the pattern and the yellow of the base, which is usually a brownish-green, will be required for a ground, so that the white ground appears as a pattern of light, dark, and half-tones. It will be seen that the work is entirely coloured down to the bottom. The appearance of work of this kind, with the ability to practise it daily to a limited extent, would be the aim which motivates the progressive teaching of pattern design throughout the senior class.

Pattern for stitching. Patterns based entirely upon text designs have been developed by the author on squared paper. These are in preparation for decoration by stitching and embroidery. If these prints, the boy should try the colour and patterns of this type are shown in Plates XXXV and XXXVI.

All the methods described are used in the decoration of the book-crafts and book-binding shown in Plate XXXVII, which

illustrate a range of work drawn from first, second and third year classes.

COLOUR

Media. Coloured papers of the "standard" type, with the addition of another half-measure of the yellow-grey known as "Isaray" ("Standard U") water-colours, for work on the flat of a purely decorative type. A limited range of ordinary water-colours for staining and for book-painting, including only the following: cobalt blue, Prussian blue, light red, crimson lake, vermilion marlboro, yellow ochre, gamboge or yellow, chrome yellow (middle).

Panels may, of course, be included if desired, but are not necessary for the teaching of colour.

The three types of brush that will be needed are the flat and the round hoghair quill, artist's brushes for the standard colour work, and a good round sable brush (No. 6 size) for the ordinary painting. Pallettes of the large enamelled kind are recommended rather than the paint boxes, which invariably become very dirty and which are expensive by comparison with individual pallettes. Sheets of white, and tinted grey paper are used in preference to drawing books, the sheets being about 1 ft. square size.

Method. A great deal of discussion is had as to the advisability or otherwise of teaching any theory of colour, and also as to which system should be adopted.

The "see-as-you-please" method. The writer has taught both children and adults by the "individual" system, in which it is assumed that an innate sense of colour is possessed by everyone and needs only to be developed along the right lines. Such was the case in regard to one or two pupils who showed a considerable and natural aptitude for colour work, but in the great majority of cases the result was a complete failure.

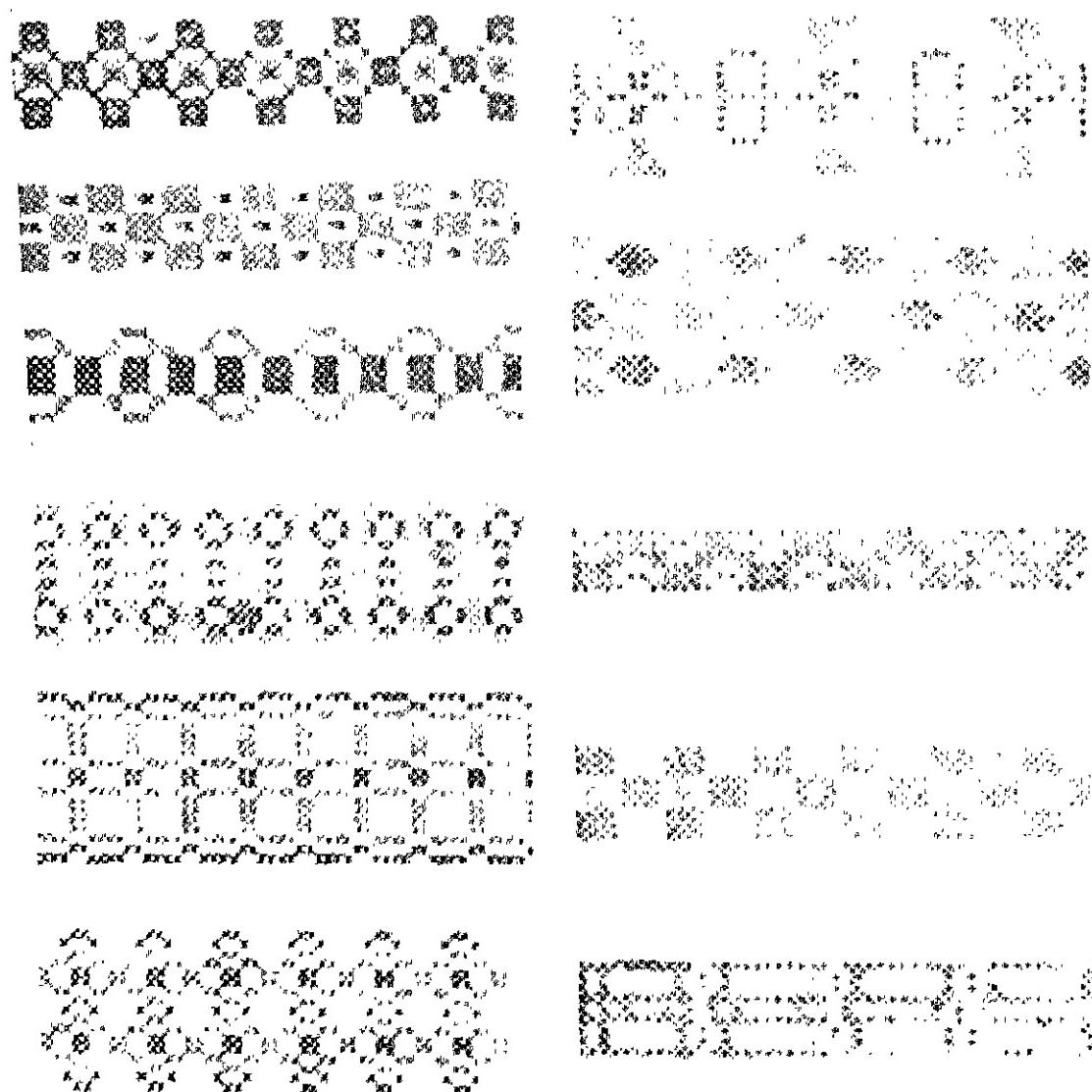


FIGURE V

Handwriting practice. Tracing and independent writing.

Children may be left to find out what happens when they mix their columns together and they may be allowed to point in any manner that they please, but their progress will be very slow. This method is quite satisfactory in the junior school, but more definite help is needed in the senior

class. It is unlikely that the teacher will notice the lack of control in the writing of children.

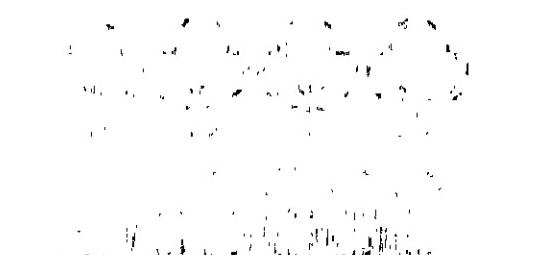
The "trace and copy" method has been tried and the author has found it to be almost useless at this stage. A good deal of assistance will be required at this stage of the work.



*THE CHILD'S DRAWING
REPRESENTING THE
WORLD OF NATURE.*



*THE CHILD'S DRAWING
REPRESENTING THE
WORLD OF NATURE.*



*THE CHILD'S DRAWING
REPRESENTING THE
WORLD OF NATURE.*

were approximately correct, but which depended upon the child's knowledge of the individual pigments and their characteristic working. Among other things, the child had to learn which pigments among the many in the box were opaque, semi-opaque or transparent, before good colour was obtainable. Water-colour painting of all kinds became a sketchy business in which the aim was to get a certain "effect," largely accidental as a rule. Other courses

were so arranged that the use of water-colour was restricted almost entirely to the "filling in" of designs with flat washes. But neither of these methods helped the average child towards an understanding and enjoyment of colour for its own sake; the technical problems occupied all his time spent with this medium.

Some instruction in the methods of painting, the qualities of colour, colour balance, the use of neutrals and the charac-

teristics in working of various pigments is absolutely essential to the production of good work in a comparatively short time. The teacher possessing some specialised knowledge of painting can get good results from the use of ordinary water colours, but the teacher who has had no special training in art finds the greatest difficulty in teaching this branch of the work.

For instance, the "primary, secondary and tertiary" colour system indicated that the delicate grey tint on the petal of a white flower was composed of a mixture of blue, red and yellow in varying proportions according to the source of light and to the effect of any reflected hues. But the system did not say which yellow, which red and which blue were to be used. In consequence, if by a lucky chance the selection was made to include crimson lake as the red to be used, and gamboge yellow, a transparent

pearly grey would result from the admixture of these two pigments with the blue chosen from Prussian, cobalt or French ultramarine. Children go for the "bright bold" colours in the box, however, and very often the blue would be mixed with vermilion and chrome yellow, both of which are heavy pigments of the opaque class. The grey in this case would be muddied and very neutral suggesting a dirty mark on the petal instead of a delicate shade, and this would be due to the use of opaque pigment which would not allow the white paper to show through the wash.

This classification of pigments for painting purposes will be referred to again in connection with water-colour painting.

The "standard" colour system. This system, which is based upon the scientific study of colour made by the late Wilhelm Ostwald, has proved itself to be the most

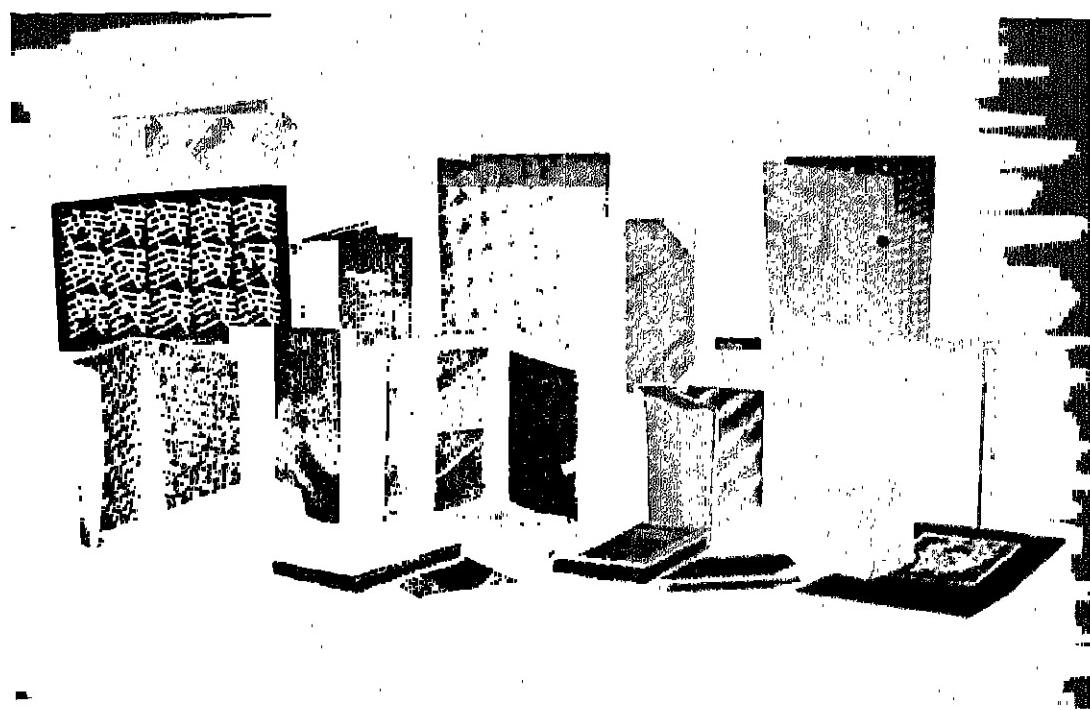


PLATE XXXVII

BOOKCRAFT EXERCISES WITH COVERS OR ENDPAPERS DECORATED BY STENCILLED, PLATE-SCRIBBED OR LINOLEUM-UNIT PRINTED PATTERNS, AND MARBLING.

successful as a means of teaching colour relationships to beginners. Specially prepared water colours, pastels and coloured papers make it possible to teach the elements of colour theory in a simple manner which gives the greatest possible amount of help in the more advanced stages of the senior work.

The system does not turn out a number of children without individuality or the ability to devise colour schemes of their own, as some critics have suggested. The necessary rule-of-thumb methods of the colour wheel serve merely to keep the children on the right track, and at least they are making progress of some kind even at this stage. Later, when they have an understanding of the order and arrangement of colour in the different kinds of schemes or relationships, they find that this system opens an infinitely wide field for them in which to experiment.

Much of the adverse criticism is due to the fact that, for school purposes, it is common only to supply a range of twenty-seven hues, tints and shades in the pigments and coloured papers. A very much wider range is available, but the question of expense makes it impossible in many cases to supply it. Nor would it be advisable to do so, as it would lead to confusion, and every art teacher knows the value of a limited "palette" for beginners.

Water colours. The "standard" water colours supplied are the nearest possible approach, in pigment, to the hues of the spectrum band. They are, in order of arrangement, red, orange, yellow, leaf-green, sea-green, turquoise, blue and purple. In addition, there is black, white and neutral grey. Neutral grey is supplied because it is not possible to get it by an admixture of black and white alone without a bluish tendency being present.

It is recommended that these colours should be used mainly for decorative work in the flat, based on the early exercises in colour schemes and colour balance. When

the knowledge of colour necessary for more advanced work is gained by the older children they may use the ordinary water colours for certain effects. A chart which shows the position of these colours in relationship to the "standard" colours is given on Plate XLII. This enables the children to use their ordinary colours intelligently in the light of what they have learned from the "standard" range, as it shows the approximate degree to which they vary from full hue intensity and purity.

Some guidance is necessary as it is not advisable to neutralise ordinary water colours by adding black. They should be varied in tone and value by admixture with other colours which will give colour-greys of much greater purity. Black makes the deeper tones muddy and cold.

To avoid this confusion many schools prefer to keep to one type of colour throughout, and this is the safer method to adopt. The "standard" range is undoubtedly the better for the teaching of colour theory as the children are restricted to the use of certain definite hues, each one of which is common to the whole class. When the ordinary colours are used and the class is instructed to mix a wash of a certain colour, each child has a different intensity to begin with so that there is no common standard on which to work. After a short time the results are too chaotic to be of any real value.

Coloured papers. These are of more value than the water colours, for they ensure that the children are working all the time with the correct hues. The normal range as supplied to most schools includes the eight "standard" hues, with one tint of each and one shade of each in addition to black, white and neutral grey. This gives twenty-seven coloured papers, each of which is quite distinct in appearance from the others, and such a range should be amply sufficient for all teaching purposes. Reference has already been made to the fact that these

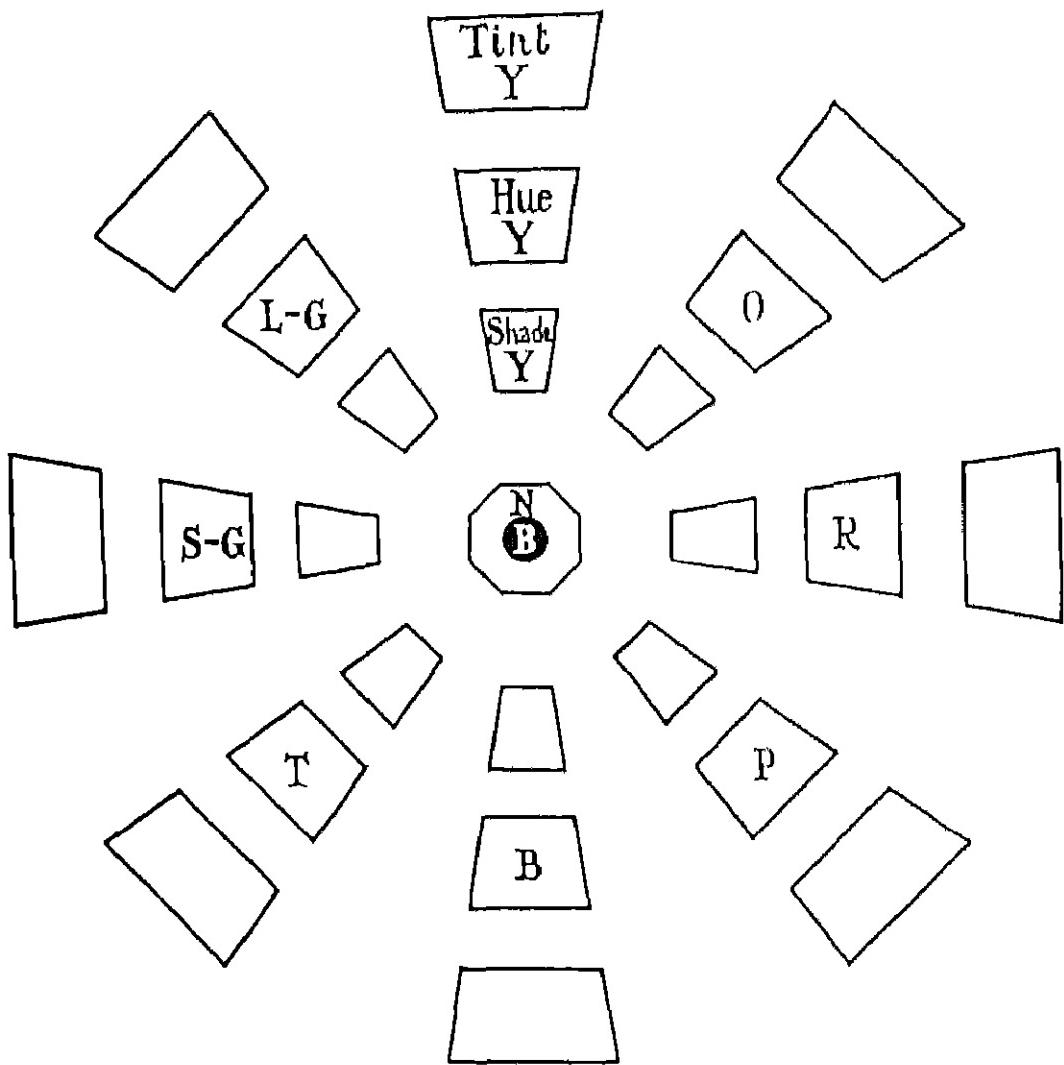


PLATE XXXVIII
A SIMPLE COLOUR WHEEL, USING THE STANDARD COLOUR PAPERS

papers compel the children to work in simple shapes and in the "flat," and the value of this form of art training cannot be stressed too highly.

The colour wheel.—It is not possible to give a full analysis here of the principles underlying the Ostwald system of colour notation. It has been dealt with very lucidly by A. Macmorland in his book on

Colour (Reeve) in regard to both theory and practice.

It is possible, however, to represent the colour wheel along with the fundamental arrangements of its components which form the basis of the colour training; these are illustrated on the Class Picture No. 135. Only one tint and one shade of each of the eight standard hues are given, as these coincide with the range of coloured papers

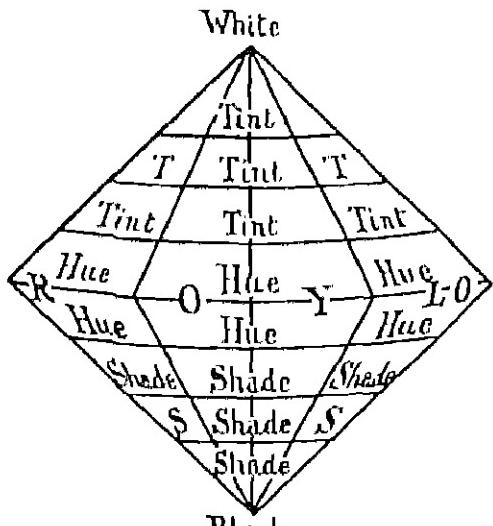


FIG. 2

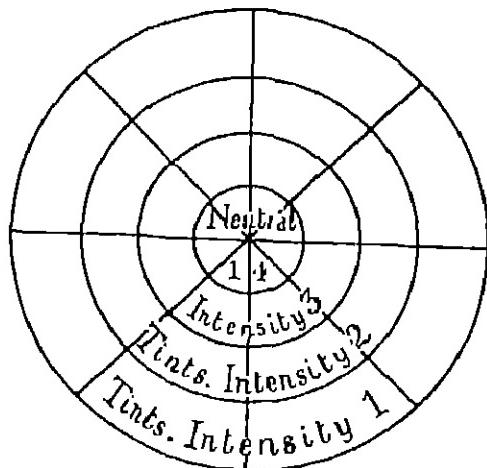


FIG. 1

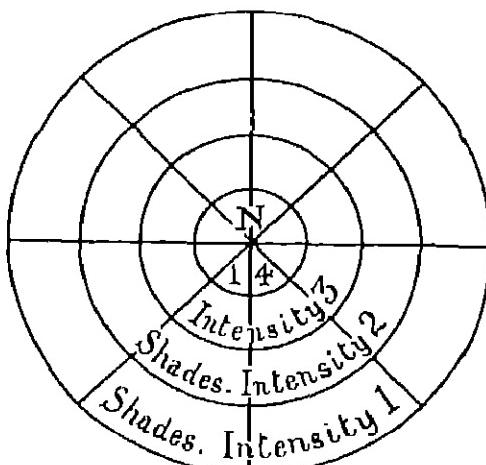


FIG. 3

PLATE XXXIX A DIAGRAMMATIC REPRESENTATION OF THE COLOUR SYSTEM

in use by the class. Actually, of course, there should be an infinite range of tints or shades on either side of the hue, extending to either white or black, and if any of these intermediates are needed they can be obtained by using the standard water colours. But for the elementary stages in the teaching of colour it is advisable to restrict the range to that of the papers

which are supplied, and which is shown on the Class Picture No. 131.

For general use and for the purpose of ensuring that the children understand the colour wheel, it is a good thing to make each child construct a simple wheel on a 1-Imperial sheet of grey or black paper. This will be arranged as shown in Plate XXXVIII by making use of the coloured

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papers. This simple wheel is easy for the children to understand, as the intermediate hues, tints and shades do not appear. Also, the tints are arranged outside the hues and the shades inside, with the neutral and black, each one in a line with its own hue.

The colour wheel, or "chromatic circle," is derived from the double-cone colour solid which condenses the theory of this system into diagrammatic form. Figs. 1, 2 and 3 (Plate XXXIX) demonstrate the fact that if a section is taken horizontally through the upper cone at any point between the apex and the base a colour wheel will be revealed which has *tints* of the standard hues in the outer circle—all of the same intensity—followed by concentric rings of the same tints greyed down in intensity but of equal value, the greyness increasing as the centre of the wheel is reached, at which point the hue intensity is nil and neutral grey takes its place.

A section on the plane of the base itself will give the full-strength hues in the outer ring, the inner rings being successively greyed until neutral is reached at the centre.

A section through the inverted cone beneath will give *shades* of the hues in the outer ring, the inner rings being successively greyed until a darker neutral grey is reached at the centre. Thus the apex of the upper cone represents pure white whilst that of the inverted cone represents pure black.

It will be seen, therefore, that the colour ring showing the tints on the Class Picture really represents an ordinary *plan*—or view from above—of one line round the surface of the upper cone, as no grey is present. The other ring which shows the shades represents the inverted plan—or the view from underneath—of a corresponding line round the lower cone. In the use of the water colours, therefore, the tints are obtained from the hues by adding white to them, whilst the shades are obtained by adding black only to the hues.

The greatest advantage possessed by the colour wheel as a teaching instrument is the manner in which it presents the opposite

or true complementary colours in exactly opposite positions one to the other, and the adjacent or analogous colours in their true relationships to their neighbours on either side.

The use of the colour wheel.—As a preliminary stage in the use of the wheel for the analysis and selection of colour schemes, the children should carry out some experiments in black, white and grey papers to familiarise them with the pictorial aspect of tone values as distinct from colour. One of the chief faults in children's work is the tendency to concentrate solely upon form and colour, so that a finished pattern or illustration looks like a patchwork quilt of many hues at full intensity. At a short distance such an example appears as a blur of indistinguishable hues. On closer inspection the ugliness of strong hues is apparent, when they are unrelieved by neutrals or tone contrasts.

Two simple examples will make the importance of this factor clear to the children. In a country school, or one having gardens and playing fields, they should be told to look with half-closed eyes at any aspect of the view which includes a flower border, flower bed or wild flowers. They should be asked to note the richness of the colours so observed against the background of grey-blue and grey-green or other greyed and "broken" colour which makes up the average landscape scene. The principle may then be demonstrated in the art room by showing them some small pieces of brightly coloured paper of varying hues and sizes grouped irregularly upon a large sheet of grey paper or millboard. Black paper is not the best for this purpose as, although it gives great brilliance to the hues, it is too harsh by contrast for the required effect.

In a city school where the direct observation from nature is not possible, the same experiment may be carried out by placing two posters side by side on a sheet of grey paper large enough to allow them to be



FIG. 1



FIG. 2



FIG. 3



FIG. 4

PLATE XL

AN EXERCISE ON VARIATION OF TONAL ARRANGEMENTS APPLIED TO ONE SUBJECT

separated one from the other. One poster should be chosen for its glaring colour and discords (there are plenty of this type to be had) whilst the other one should contain a well-balanced scheme with some strong hues and greyed colour. The subject matter tends to distract the concentration of the class, and to avoid this difficulty the posters should be placed upside down on the background. The matter of choice between the two may be put to the vote, on the grounds of richness of colour (not quantity) and pleasing appearance, without any technical terms or previous introduction of the purpose of the test. To obtain a fair test in which individual children shall not be influenced by the show of hands, it is advisable to vote by ballot only. It will be found in most cases that the choice will fall upon the better example of the two, without the children knowing why.

The test will help the children to understand that there is something more important to be learned than the mere fact that blue is placed in a picture as the "opposite" to yellow. They will then be in a more receptive frame of mind for the simple experiments in the use of neutrals and tone values which will follow.

These should be conducted in conjunction with the early lessons on design and pictorial arrangement which have been mentioned in the previous pages. At the start the general principle to be adopted is that the design, or illustration, should be entirely in silhouetted forms against a grey background. Then the white areas should be chosen and should be restricted to the smallest parts of the "pattern" composed by the picture as they are the most "intense" and the highest in key, or lightest in tone value. The black areas act as the intermediate stage in size, but they are placed upon the grey background first. The white areas are pasted on last of all, as they are the smallest in size.

This exercise should be followed by a reversal of the tonal arrangement, but not of the principle, of the original. The white

areas should now take the place of the black ones, the black being retained for the smallest areas or "accents." This makes the black appear to be more intense than it was in the first case.

This type of exercise is illustrated in Figs. 1, 2, 3 and 4 (Plate XL) in which four tonal arrangements are applied to the same subject. By doing this the children learn that different effects are gained not so much by the use of different hues as by variations in *tone*. This leads to the realisation that grass, for instance, need not always be represented by a wash of bright green nor the sky by a wash of blue, but that, providing the scheme is correctly balanced, any hue may be used for any particular part of the subject.

Once this fact is realised, the decorative aspect of the children's work will receive a tremendous impetus.

The design element that is mainly concerned with the exercise is dominance. It is applied to the areas of greatest intensity by taking care to ensure that one such area is larger than any of the others of the same intensity. Thus, if there are three areas of white (or intense hue) in a design, one should be the largest and should be placed out of the centre of the design; one should be smaller, but somewhere near the first one, and the other one should be the smallest and should be placed so that it balances the other two areas. This is a very rough and ready rule which has to be modified in detail as to the size, number and position of the areas to suit every individual design. It should not be assumed, therefore, that this "rule-of-thumb" suggestion which is so baldly stated above must be applied arbitrarily to every design and illustration in just this manner. The principle must be understood; the application depends upon the individual child, for this may vary throughout a group of drawings and yet be correct in every one of them.

Figs. 1, 2, 3 and 4 (Plate XLI) show some early attempts at this type of treatment made by children who have been left

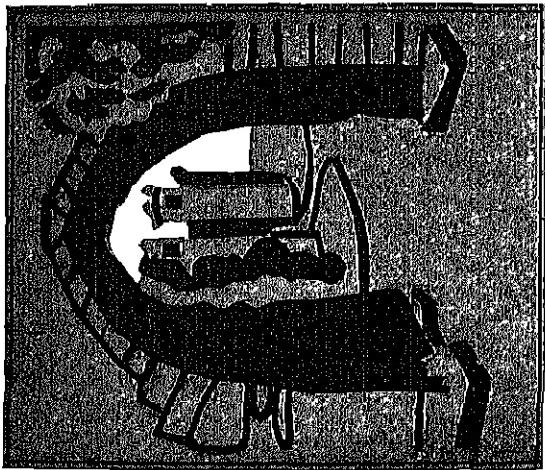


FIG. 1

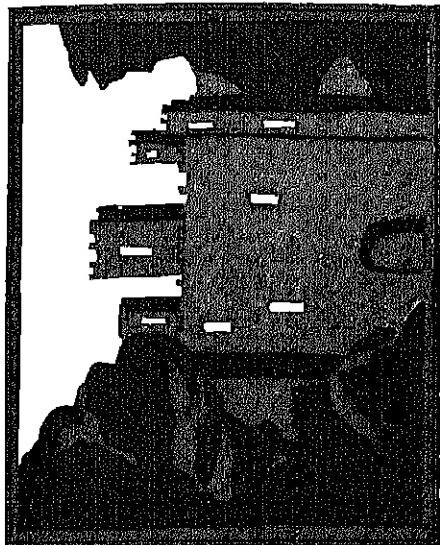


FIG. 2

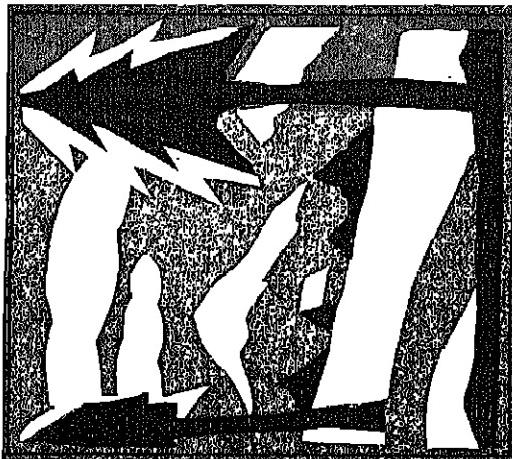


FIG. 3

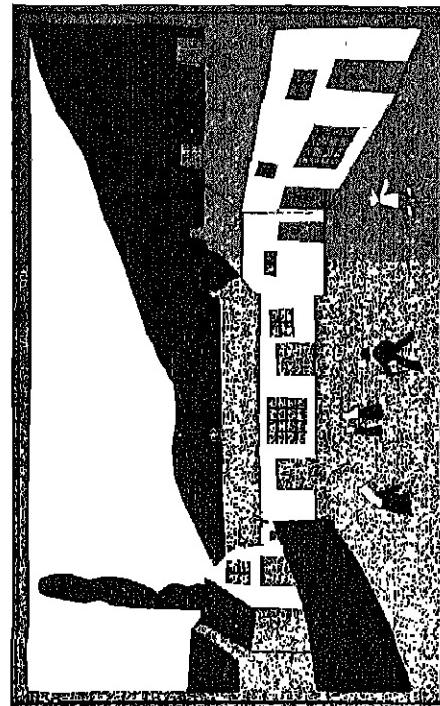


PLATE XLI
FIRST ATTEMPTS AT TONAL ARRANGEMENT, IN BLACK AND WHITE PAPERS ON A NEUTRAL GROUND

come the near neutrals, which act as buffers between the areas of the stronger hue-intensities. Alternatively, the background areas may be occupied by light neutrals, whilst the remaining stages are "built up" one by one until the smallest and most intense "accents" are reached, as in landscape work and portraiture.

In the early stages of these exercises it is advisable to restrict the children to the use of two hues only, which are immediately adjacent to each other on the wheel. If the range of a related scheme is carried too far round the wheel until it reaches the extent of a quadrant, a certain percentage of opposing or contrasting colour will be included. As, however, it will not be the hue which is immediately opposite to the basic hue of the related scheme, the result is unpleasant. It does, in fact, introduce what is known as a "discord," as this hue which is influencing the extreme limit of such a scheme is neither sufficiently near to the original hue to be strongly related to it, nor sufficiently far away round the wheel to be a true "opposite" or complementary to it.

A related scheme may be grouped about any hue, from any part of the wheel. It may be based, as indicated above, upon a hue which is at full intensity; or it may be composed entirely of greyed hues, and may include neutral grey. In every case, however, the component parts of the scheme should be of different tone values, one from another.

The contrasting or complementary scheme. No. 3 (Plate XLII.). An example of this type of scheme is shown in colour on the Class Picture in the same diagrammatic form as that adopted for the related scheme.

As its name implies, the contrasting scheme includes the hues which are situated in diametrically opposite positions on the wheel.

The success of such a scheme depends entirely upon the correct relationship which should exist between the quantities and intensities of the opposing colours to be

used. One or other of the opposing hues should dominate the whole scheme.

When two opposite hues are placed in contact, one with the other, at full intensity, each one enhances the value of the other to the fullest extent. Thus, if a patch of red be placed upon a larger area of sea-green, both hues being at full intensity, the red will appear to be even more intense. This is due to the fact that each hue is the true opposite of the other.

If, on the other hand, the two adjacent hues are not true opposites, each one will be influenced by the complementary of the other. This means that if a small area of pure yellow, for instance, be placed upon a larger area of purple, the yellow will appear to be tinged with green (leaf-green, or yellow-green, being the complementary hue to purple). If the same yellow is placed upon an area of turquoise, or blue-green, it will appear to be tinged with orange (the complementary hue to turquoise). Thus, if this experiment is carried out so that the results may be seen side by side, the yellow will have a different appearance in each case.

These colour "influences" play a large part in the teaching of water-colour painting, and their effects may very clearly be seen in the colour values of a group of objects placed before a strongly hued background, or in a group which contains objects having a highly glazed or polished surface in close contact with intense hues such as those of oranges or flowers. Landscape subjects present the same characteristics of colour influence, and this should not be confused with direct colour reflection. The difference may be illustrated by two simple examples which are of common occurrence.

Colour influence may be seen upon a whitewashed cottage wall if the sky beyond the end of it appears to be a deep blue, as occasionally happens on a hot summer day. The blue of such a sky contains a great deal of violet, the complementary hue of yellow. The effect of this upon the cottage wall is quite noticeable as, although the white-

washed surface, directly in front of the observer, may appear as a dazzling white in the strong sunlight, a glance at the end of the same wall where it meets the sky will show a distinct yellow "glow" in the whiteness of the surface which increases in intensity as the extreme edge is reached. Similarly, on a hot summer day, if the observer should be looking across a yellow cornfield towards a belt of trees he will see that the shadow beneath them appears to be a very deep-toned and definite blue-violet.

Colour reflection may be seen in glassware when it is placed against fruit, flowers, wine, etc., and when the lighting is suitable for its occurrence. It also appears on glazed surfaces, smooth fabrics, and various other textures under suitable conditions. One of its most common forms is the appearance of a patch of colour "thrown" from an object in strong light on the side of an adjacent surface which is in shade.

In the first-year work the question of colour influence will arise only in connection with the correct choice of complementary hues. Children can select these from their limited range of papers without much difficulty, but they cannot apply them to illustrations in the proper manner. They will, if they are left to their own devices, cover the whole design with pairs of complementary hues at full intensity. The effect of a number of contrasting hues at full intensity when placed in juxtaposition in this way is one of extreme harshness and ugliness, so that the teacher will find that the previous exercises in tonal arrangements will be of the greatest help at this stage.

The children should be led to work along the same lines in planning their colour schemes. A related scheme of one dominant hue, with its tint, shade and neutral, should be applied to the major portion of the design, whether this is pictorial or otherwise. The remaining and much smaller portions should be arranged so that they may be occupied by the contrasting hue, with its own tint or shade, the hue itself taking the most

important position where it will balance the rest of the design by its intensity and not by its size.

A very simple arrangement of a type that is suitable for first-year experiments is shown on Class Picture No. 133 in colour. It is not wise to attempt to go beyond this stage in the definite teaching of colour in the first year unless the teacher finds that the children have a thorough grasp of the principles so far involved.

By widening the range of the dominating related scheme a more advanced type of colour pattern is introduced, and this will be referred to at a later stage in the course.

It should be understood that while these progressive exercises in colour arrangement are being taught, the children should still be encouraged to make full and free use of their water colours for the ordinary purposes of illustration or expression drawing.

OBJECT DRAWING

Media.—Pastel, on tinted paper; pencil, line and wash, full colour wash, and flat colour as for posters.

Only the first two media will be used in the first year, so that the disciplinary or training value of this work may take its right proportion as a part of the whole scheme. This is necessary because the drawing of objects plays an important part both in pictorial composition and in decorative work in the flat.

Object drawing should be regarded as being one part of a complete scheme and not as being an end in itself. Its particular value lies in the training that it gives in draughtsmanship, along with the development of the powers of direct observation, judgment, and the perception of form as being something more than a mere mechanical outline. These factors all combine to produce the "still-life" painting; one of the most exacting forms of pictorial composition and one which tests the abilities of the most experienced artist, demanding

a thorough knowledge of design, tone and colour values, textures and technical methods of painting.

Although it is very unlikely that the children are going to reach the stage of painting groups of objects in full colour (which should never be attempted unless they are capable of doing so, as otherwise failure and discouragement are certain to follow), they will need a considerable amount of object drawing in connection with poster work of all kinds, and with illustrations of a more advanced type.

Pastel work has been referred to already, and it is in this section of the course that it may be used to effect. It is essentially a medium for "suggestion" rather than for careful delineation, and this fact makes it especially useful for the representation of textures, highlights and strong colour notes of which a group of objects is so largely composed. It compels the child to study the pattern of the group as seen against the background, and defies all attempts to reproduce "niggling" detail. Therefore it has a definite value in this course, providing that the right type of subject is chosen.

In the early stages, the pencil should be used in precisely the opposite manner. It is a rigid and unyielding instrument in the hands of the child, although to the experienced artist it is capable of an infinite variation of line. This essential characteristic of the firm point, as distinct from the soft bluntness of the pastel and the pliability of the brush, makes it necessary for the children to be taught how to hold the pencil properly and how to get a varied line strength. Analytical nature drawing is excellent training for this purpose and it may be allied to object drawing in this way.

The exacting technique that is required to produce a "shaded" pencil drawing of any artistic value makes this particular form of work a waste of time in school, although it has been very popular for many years. If we omit the obvious "scribble"

as a means of rendering tone values and textures over fairly large surfaces, the pencil must necessarily be used with great skill and knowledge if it is to produce anything more than the appearance of a dirty smudge.

It is this same lack of skill and knowledge (which, surely, is only to be expected) that makes the shaded pencil drawing of the average child look so dead, lifeless and mechanical, although hours of patient work have been put in on the subject. Furthermore, the child knows that the drawing is unsatisfactory, but the teacher cannot explain why without launching out upon a veritable sea of technicalities which are completely beyond the understanding of the child.

Method.—(Plate XLIII.) In pastel drawing, large sheets of paper should be used of at least $\frac{1}{2}$ -Imperial size. The "pastel drawing book" with pages about 8 in. by 5 in. should be scrapped completely, for what child can draw freely with such a medium on a small page which will not even lie flat? In addition, he, or she, is afraid of spoiling the drawing, which will then remain for evermore as a discouraging blot on the record of progress. Such an attitude of mind compels the child to work in a pettifogging manner and destroys any impulse towards vital and lively work of real merit.

Objects should always be arranged with care in front of a suitable background, and the practice of making the children draw the board on which the objects stand should be avoided as the hard lines of these edges, usually disposed at awkward angles, interfere with the lines of the grouping. The drawing should be arranged in regard to the edges of the sheet of paper that is used for it, and for this reason it is not advisable to set single objects up for study as it is difficult to arrange one object only to form a picture.

The choice of objects should be restricted to those which have good form, simple lines and good colour. Their suitability for drawing by "suggestion" should be borne

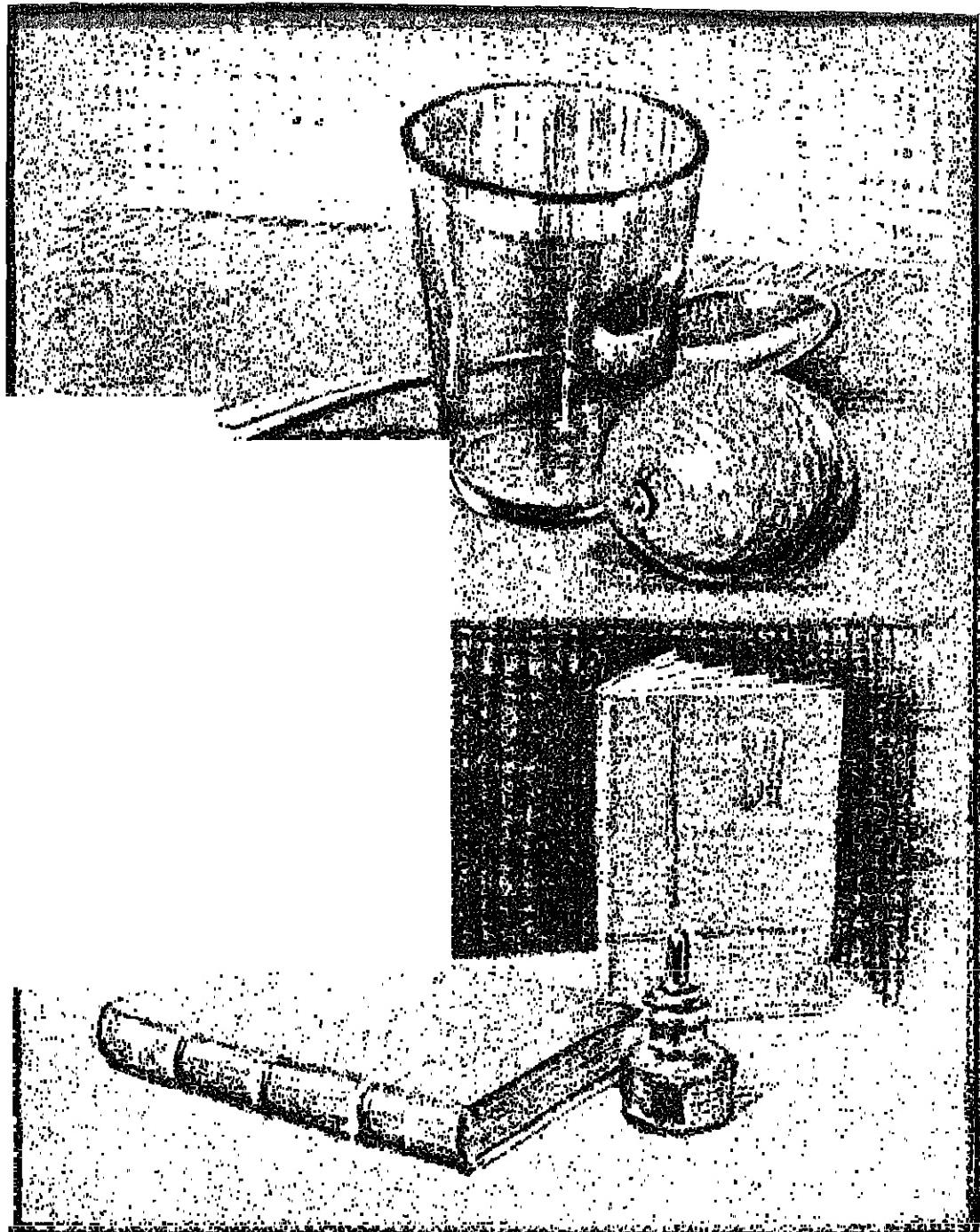


PLATE XLIII

THE TECHNIQUE OF PASTEL, CRAYON OR CHALK DRAWING. LIGHTS AND DARKS ONLY ARE
DRAWN ON A NEUTRAL OR HALF-TONE GROUND

80 TEACHING IN PRACTICE FOR SENIORS

in mind. It is very difficult to "suggest" an attaché case which is simply a slab of dingy brown, whereas an ordinary plain tumbler shows clearly defined high lights and darks, with areas of colour from surrounding objects such as fruit, and will compel this type of drawing by reason of the invisibility of many of the edges or outlines. If the grey paper is left untouched for the half-tones and only the high lights and darks are drawn in, the children are learning a great deal about drawing and about art as distinct from the representation of an object by a mechanical rendering in outline only.

Children should be encouraged to sit back for a few moments before they begin their drawings, and to look with their eyes half closed at the whole group of two or more simple objects against the background until they can see only the lights, the darks and odd patches of colour. Then they should endeavour to draw just what they see in this way, and not what they know to be there. They should draw the group as a whole, and not bit by bit or one object at a time. This trains their powers of observation in a way that can never be achieved by prolonged staring at one part of the outlines only.

They should be encouraged to draw at arm's length, and as freely as possible. This will compel them to adopt a better style and will enable them more accurately to judge the proportions and line directions of the various parts of the drawing.

Above all, they should be made to draw with economy of line. Every line should have a meaning, and several lines carelessly drawn will not take the place of one line that is expressive of character, direction or texture. Overloading the surface of the paper is the commonest fault in pastel drawings. It destroys the "bite" of the surface so that full colour cannot be put on, and causes an unpleasant shine to appear, which destroys the texture of the drawing.

It is permissible to use the side of the

pastel for bold effects and for covering large areas but the strokes should be put on crisply and firmly so that the character of the drawing is retained. The only time when the "rubbing-in" method may be adopted to get an even tone is when it is necessary to tint the paper over a definite area such as the background, or to get certain sky effects. The pastel should, however, take its place in the school course as a drawing medium and not as a painting medium.

Pencil work.—As distinct from the "suggestive" technique of the pastel, the pencil drawing should aim at definite representation. It thus becomes the obvious medium for analytical drawings of all kinds, and for the teaching of perspective in the very elementary form in which it is applied to the course.

The "nature" drawing should be of the simple type which is shown in Plate XLIV, the emphasis being laid upon clean line work of varied strength and not upon the quantity of foliage that is drawn within a given time. Each of these exercises is intended mainly as a pure drawing test for the purpose of training the children in the method of handling the pencil to get expressive line quality. The applications of this work should be made general, so that the children work in the same manner as regards definite and varied line in their sketchbooks. This will be of great benefit to the illustration work as they will soon learn to select the essentials of their subjects and to present them with economy of line. Freedom of style will come later on and although it should be encouraged it should not be forced upon them until they have had some preliminary lessons in the use of the pencil.

Flower and leaf forms may be conventionalised to provide units for pattern designs or for border repeats in connection with the first lessons in colour, as shown in Plate XLV. It is a fact that the designs so produced are usually less interesting than those which are built up with abstract units, or units which are derived from other forms.

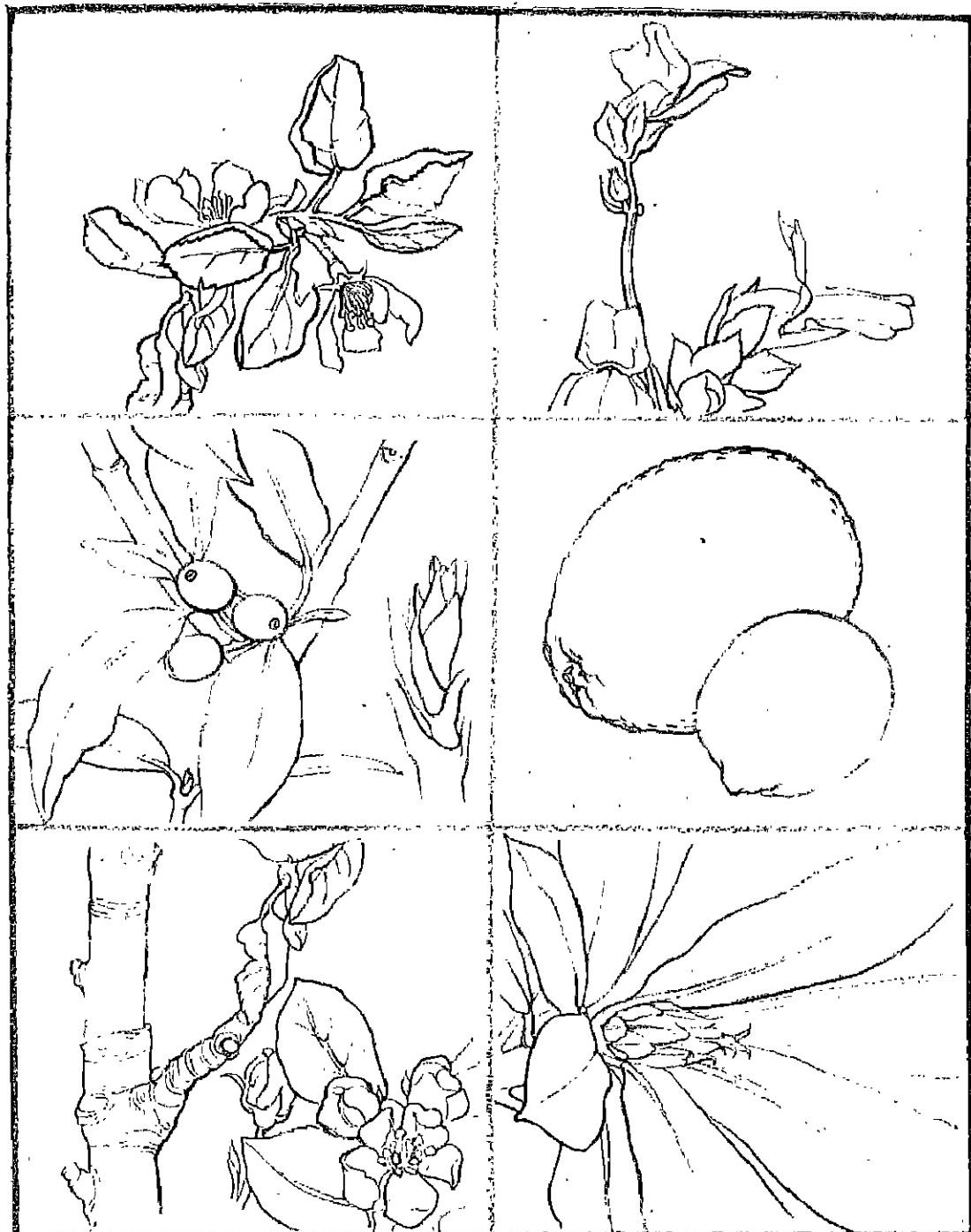


PLATE XLIV

PENCIL DRAWINGS OF NATURAL OBJECTS, TO GIVE PRACTICE IN THE USE OF EXPRESSIVE LINE
WITH VARIATIONS OF STRENGTH

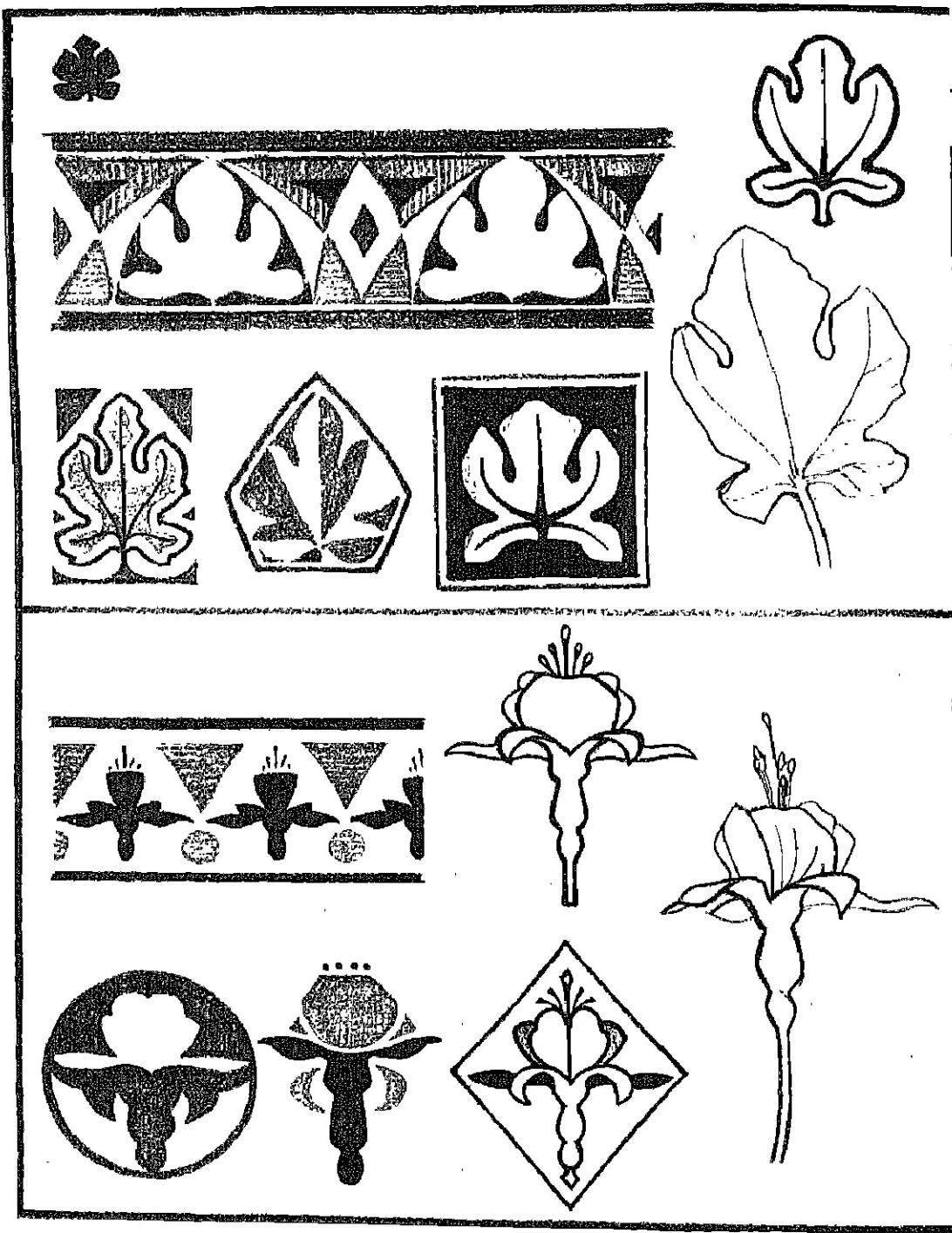


PLATE XLV
NATURAL FORMS, CONVENTIONALISED, BECOME DESIGN UNITS

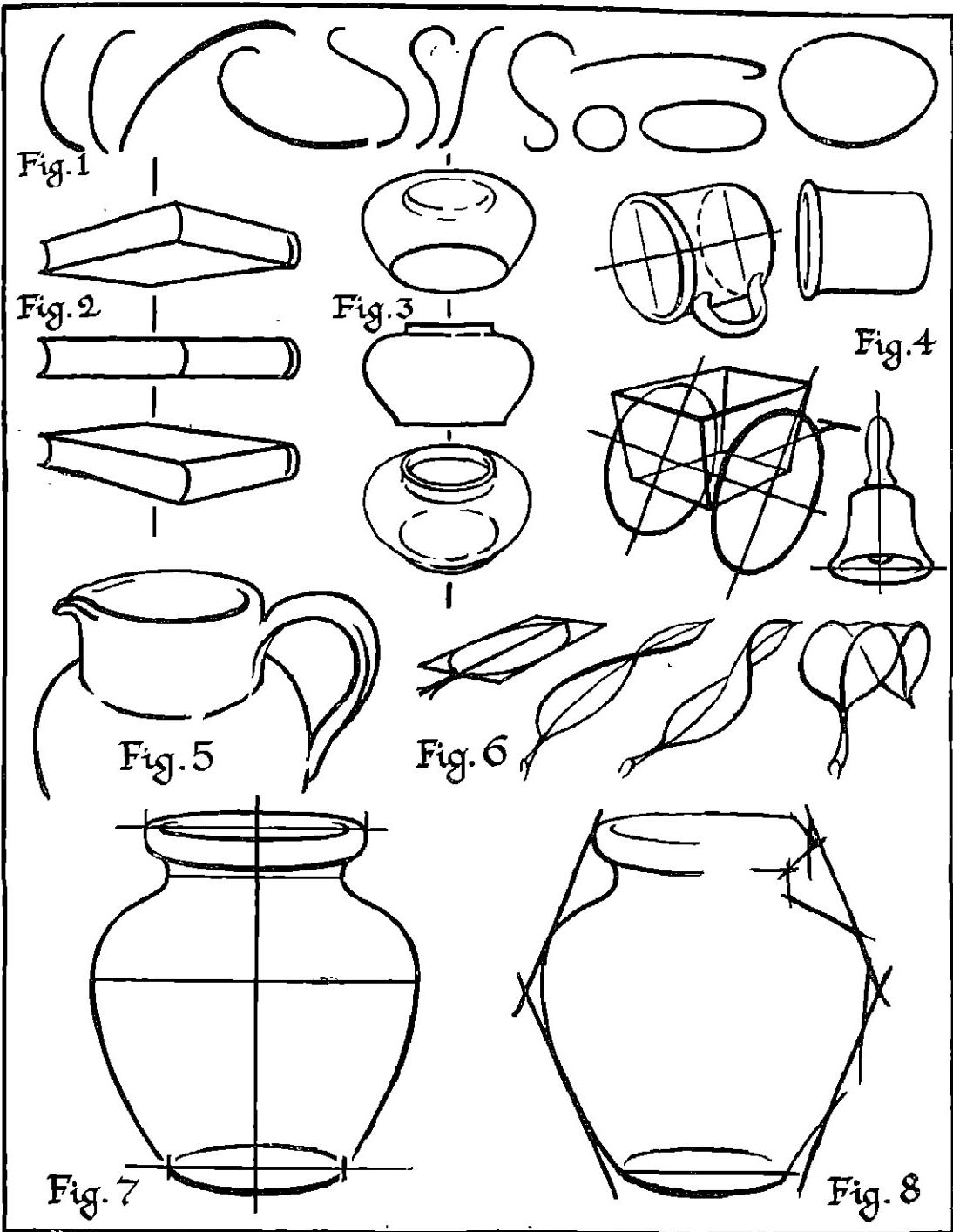


PLATE XLVI
ESSENTIALS OF OBJECT DRAWING

This observation refers only to children's work, for natural forms provide the inspiration for many of the excellent block-printed fabric designs which are produced by advanced students of that particular craft.

In the first year it is necessary to give a certain amount of time to the essentials of all object drawing, but this time should not be extended beyond the period that is required for this purpose. The opportunity should be taken to utilise these exercises for the first lessons in pictorial arrangement, which have already been referred to.

Plate XLVI shows some of the points which should be dealt with during this period of the course, and it is possible to arrange many of the details in this way on a $\frac{1}{4}$ -Imperial sheet of paper so that the children may have the sheet for handy reference when difficulties arise instead of having to make complete drawings for each separate point. Problems of foreshortening and perspective should be dealt with in the simplest possible language, assisted by homely examples and plenty of quick sketches rather than by elaborate and carefully finished drawings.

The next stages involve the use of different methods of treatment and different media. Pencil outline, brush drawing and pastel or charcoal may be used for the various effects, and this period should include the mass drawing in one or two tones, with or without an outline. The outlined mass drawing is a decorative treatment which will be needed occasionally in the poster designing section of the third-year course, and which may be applied also to book jackets and wall decorations. Examples of this special form of treatment are shown in Plate XLVII.

Some of the problems of arrangement of objects within a definite border line have already been mentioned in connection with imaginative and illustration work, and the same conditions apply to the arrangement of common objects in a group against a background.

It has been stated that objects should not

be drawn singly. They should be combined to form groups so that the same procedure may be followed in this work as in the ordinary illustration lessons. Plate XLVIII shows the importance of correct placing of the individual objects for the purpose of obtaining unity of effect in the group as a whole. This effect gives the group its pictorial quality, which depends more upon arrangement than upon the intrinsic interest of the individual objects themselves.

Fig. 1 and Fig. 3 (Plate XLVIII) show how unity of effect is destroyed. The main lines of the drapery folds converge upwards and out of the picture, thereby carrying the eye of the observer away from the centre of interest. In following them back, the attention is led to each object individually and is dispersed between them. The objects are ranged in a row, side by side, thus spoiling the group effect which it is desired to obtain. In Fig. 2 and Fig. 4 the same objects have been rearranged so that they form a compact group, with their outlines linked together and with the bottle acting as the dominant feature of the group. The drapery lines now converge towards this centre of interest, thereby concentrating the attention of the observer upon the dominant feature. The drawing has been rendered in tonal washes to show how, in addition, this may be helped by the intensity of the highlights on the bottle which hold the attention. The drapery lines are also rearranged to follow round the form of the bottle, thereby assisting in preserving the appearance of unity throughout the picture. This new arrangement enables the hard line between the background and foreground to be covered completely, thus doing away with an unnecessary and unpleasant feature which so often tends to "cut the drawing into two parts."

This example is not, of course, suitable for first-year work, but it shows the great importance of the background and the foreground, which should be considered in even the simplest drawings, so that work of this type may be attempted by some of the

children in the third year, if time permits, with more hope of success than is normally the case.

Object drawing is of very little value unless it is taught in its relationship to other forms of art, but if the sympathies of the teacher incline towards this kind of work it may be developed into a very successful scheme which will still include the essentials of colour, line and form as applied to other types of pictorial design.

Perspective.—Some knowledge of the elements of perspective drawing is necessary in all but the purely decorative branches of the course, but it is seldom that these elements are taught in the form of definite lessons. The children are expected to acquire this knowledge by observation and by references to homely examples.

Such references are excellent for this purpose, but they can give the children nothing more than a very hazy idea of how to apply such observations to fresh situations. As in the case of object drawing, one or two lessons spent in teaching the fundamentals will give greatly increased value to later illustration work, and will give the children much more confidence in their drawing powers. The most important gain in this respect will be the increased power of visualisation on the part of the individual child which will follow upon an understanding of the simple principles of perspective drawing. If the child has a fairly clear mental image of any particular object which he has seen when it was in a certain position, and he wishes to change its position in his drawing, he will be able to work it out from a sketch of the original position into something like its correct form.

Plate XLIX shows some of the fundamentals of perspective as it is applied to object drawing and illustration. A sheet of notes of this type may be built up by the children in the course of two or three lessons which will be very valuable for reference purposes later on. The explanation of the use of vanishing points and of

the horizon line may be made very simple indeed. The part which at this stage has to be left to the judgment and observation of the child is the question of foreshortening of the receding faces of objects. This can best be done by encouraging the children to make plenty of quick sketches of objects of all kinds, and in different positions. The geometrical method of obtaining these foreshortened distances should not be introduced at this stage, if at all.

When first dealing with the points illustrated in Plate XLIX, it will be found that the children will understand them better if an artificial horizon line is used. This can be managed by stretching a length of white tape between two sewing frames, or between two chairs raised upon desks, so that the tape is about on the eye level of the children. A fairly large and light rectangular object, such as an empty box file, may be used to demonstrate the changing appearance of its edges and their directions as it is raised above the eye level or is lowered beneath it.

The realisation of the fact that rectangular objects which stand upon one another, or upon the same plane, have their vanishing points on the same horizon line although their vertical faces may be inclined one to the other as in Fig 2 (Plate XLIX), can be supplemented by another drawing. The same objects may be used, but they should be placed in a different position from that which is adopted for Fig. 2, so that the vertical faces are turned at various angles to one another.

In the next stage, the original position of the two books should be resumed, but the cover of the upper book should be tilted up at an angle of about forty-five degrees from the horizontal. The children should now be led to observe that, whilst the actual horizontal lines of the book are still shown as receding to the same two vanishing points as before, the lines of the edges of the tilted cover recede to a new vanishing point which is a long way above the horizon line of the picture. This point may be represented as being on a vertical line drawn

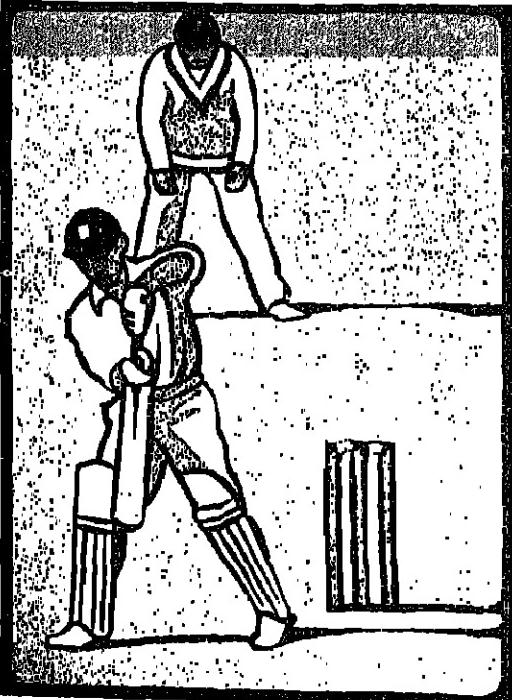
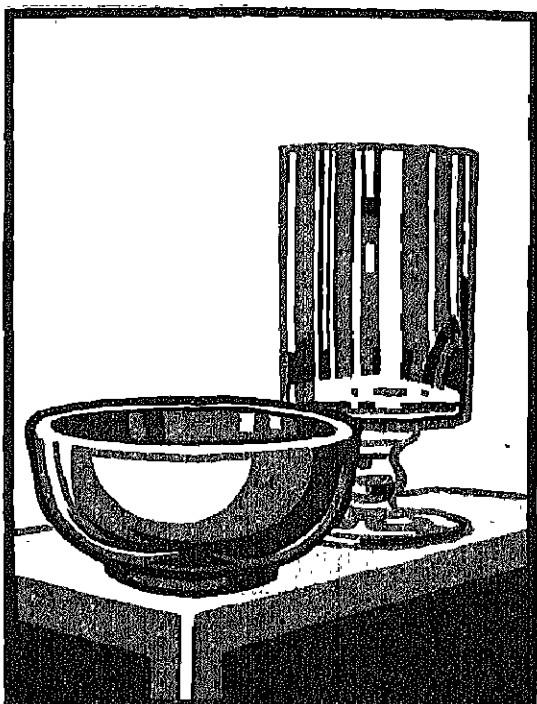


PLATE XLVII
OBJECT DRAWING IN OUTLINE AND THREE-TONE VALUES IS THE BASIS FOR DECORATIVE WORK
AND POSTER DESIGN

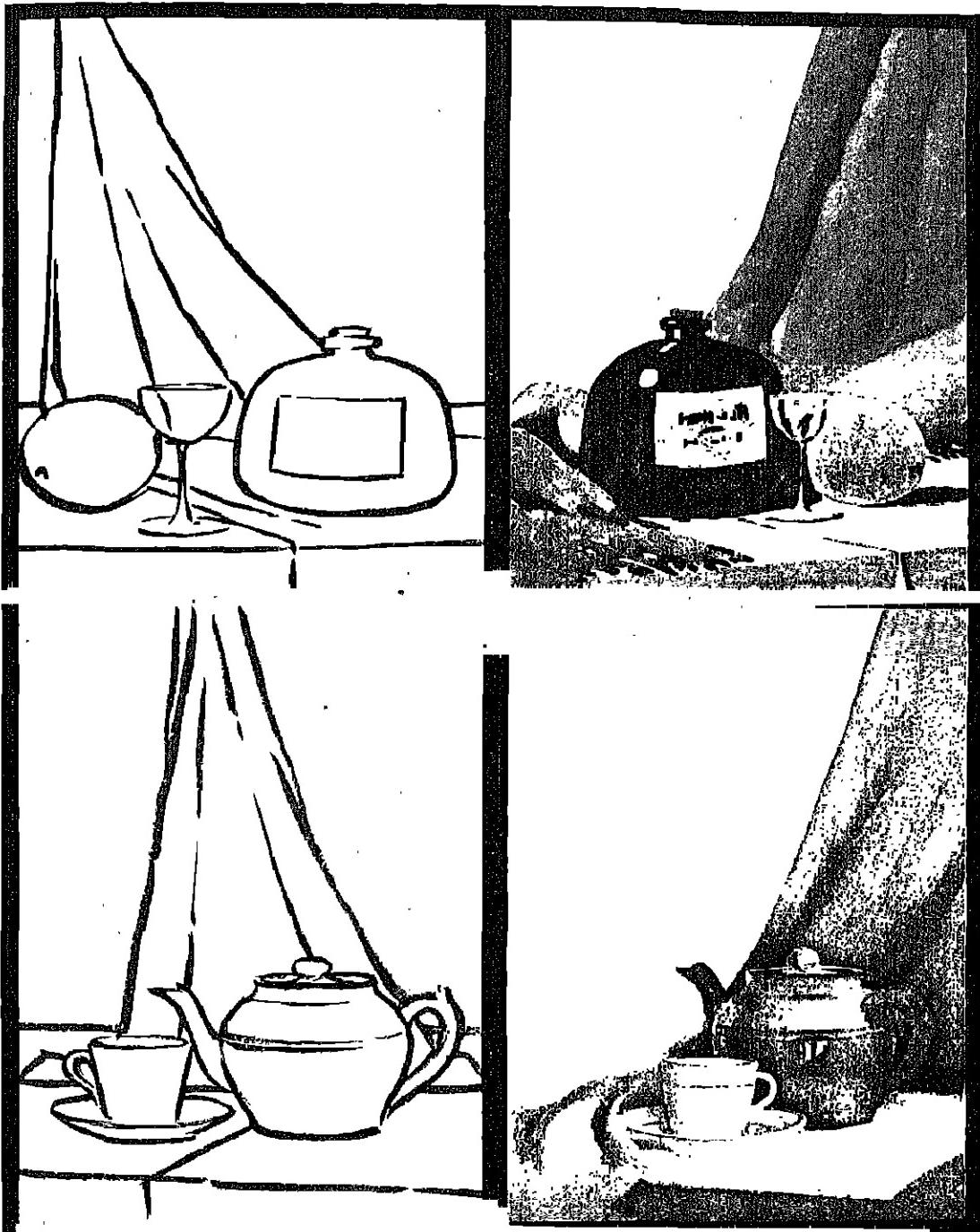


FIG. 1
FIG. 3

FIG. 2
FIG. 4

PLATE XLVIII
METHOD OF OBTAINING UNITY IN OBJECT DRAWINGS

through the original vanishing point to which the cover edges receded.

The chief difficulty which confronts the children will arise when they are drawing a group of objects in which one of a similar rectangular form is tilted up on one corner, so that no one single face is resting on the horizontal plane. The parallel lines of such an object recede to an independent pair of vanishing points which, of course, are not on the horizon line of the picture to which the object belongs. The foregoing examples shown in Plate XLIX should assist in the solving of this difficulty in the minds of the children.

Fig. 4 (Plate XLIX) illustrates the method by which cylindrical objects may be drawn in perspective or visualised for the purposes of sketching and memory drawing. Such objects should be imagined as being enclosed within a rectangular case, as shown in the diagram. If these bounding lines are lightly sketched in, the children are enabled to understand the reason for the variation which exists between the curvature of the opposite ends of the cylinder, as drawn in perspective. They see that, as the square ends of the "case" become foreshortened in perspective, the contained circles of the ends of the cylinder become ellipses, the major axes of which are at right angles to the centre line of the solid. This latter fact does not concern the children at this stage, although the projection of the circle on to an inclined plane may follow later as an exercise in plane geometry.

Fig. 7 (Plate XLIX), shows the application of the same principle to objects having a circular base, and which have to be drawn as standing upon the horizontal plane. Direct observation with free drawing is sufficient as a rule, but one exercise of this type will help the children to understand and to gauge the curvature of the base of an object in such a position.

If again a square "case" is imagined as enclosing the base of the subject, its edges may be drawn in perspective as shown in Fig. 7. An ellipse is drawn, freehand, within

this perspective view of the square, and will represent the outline of the base of the object. One fact which may be pointed out to the children, at a later date however, is that the edges of the containing square, being in perspective, do not form a true diamond shape. Therefore, if the diagonals of the square in perspective are drawn, the one which contains the minor axis of the contained ellipse is not bisected by the other. In Fig. 7 *a* will be shorter than *b*. This point is mentioned here because confusion often exists between the square in *perspective*, and the square in *projection*. In *projecting* a square on to an inclined plane, in a similar position, its opposite sides would remain parallel to one another, so that *a* would equal *b* in the projection.

Fig. 5 (Plate XLIX) illustrates the most horrid example of the picture which has but a single vanishing point on the horizon line. Although children grasp the principle very easily, in this case they always find it difficult to draw such a scene from memory, and they make it appear as though the observer is standing on a bridge at a great height, looking down upon the lines instead of looking along them. This is because they do not realise that however great may be the distance from the observer to the horizon in actual fact, that distance has to be represented between the line of the "foot level" of the observer and his eye level; an average height of, say 5 ft. 3 ins. in reality, which has to be shown on the drawing within the space of an inch or two.

The same principle should be applied to the drawing of roadways, paths, railway lines, etc., in the position shown in Fig. 6, Plate XLIX. This exercise, as a drawing from imagination, always gives the greatest difficulty to the average child or adult. But if the position of the observer is realised in relationship to eye level, the problem is very much simplified. This point should be dealt with as thoroughly as possible, for its applications crop up in nearly every illustrative drawing from memory, and in every landscape sketch, however simple it may be.

V.P.1

Horizon Line or Eye Level

V.P.2

FIG. 1

V.P.1

V.P.3 Horizon Line or Eye Level. V.P.2

V.P.4

FIG. 2

V.P.1

Horizon Line

V.P.2

FIG. 3

V.P.1

Horizon Line.

V.P.2

FIG. 7

FIG. 4

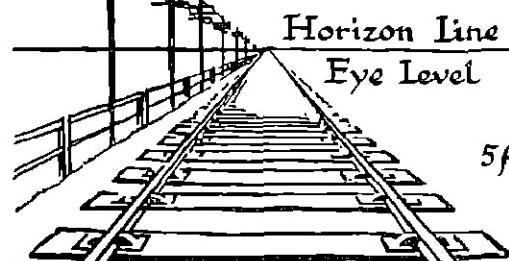


FIG. 5 'Foot' Level of Observer

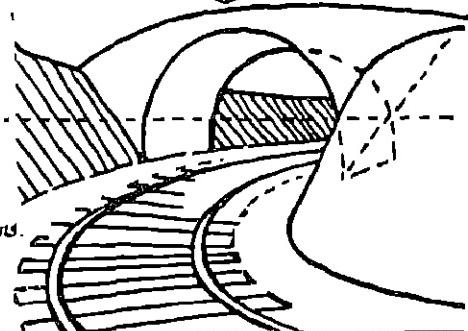


FIG. 6

PLATE XLIX

SOME ESSENTIALS OF PERSPECTIVE DRAWING

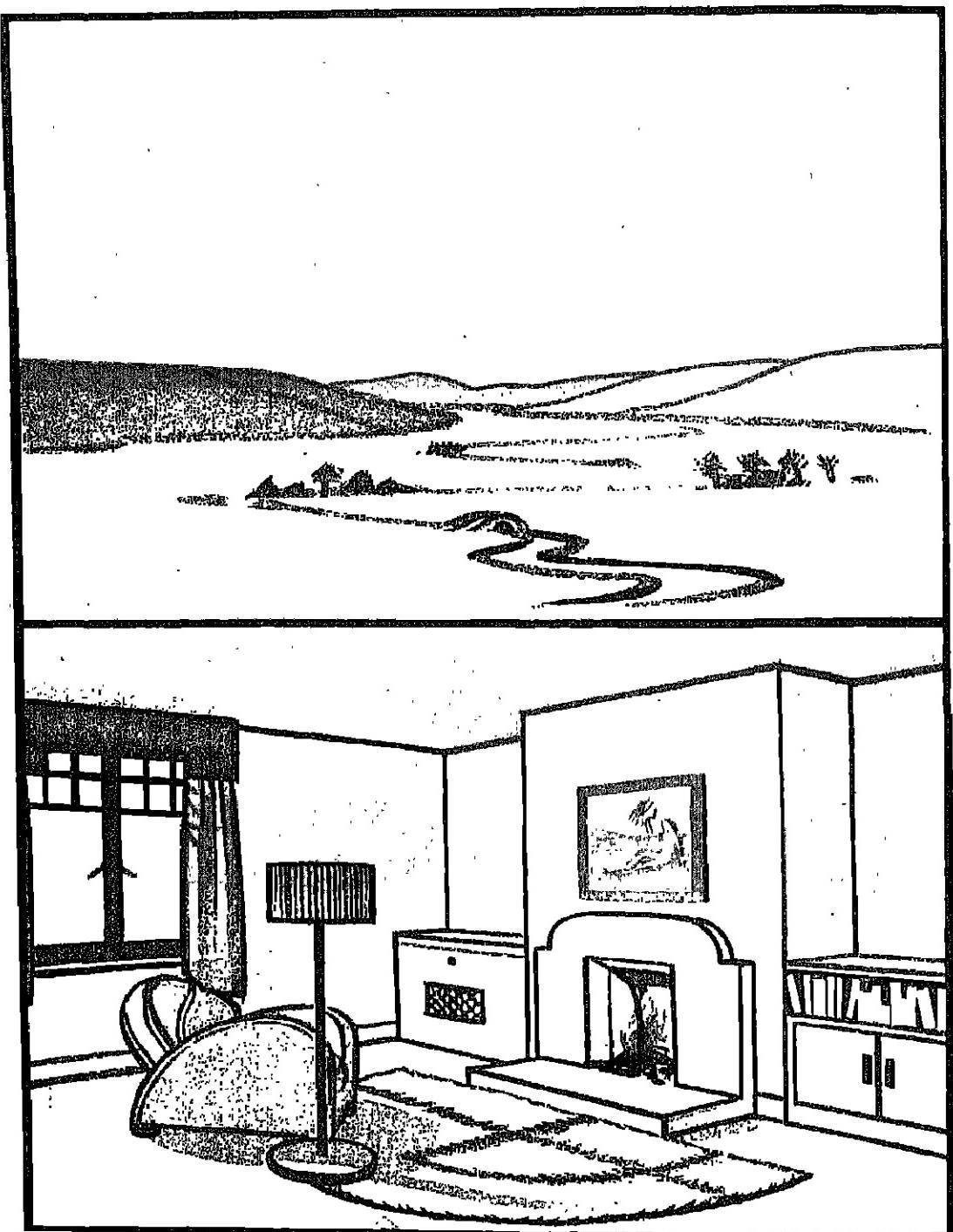


PLATE L
APPLICATIONS OF THE ELEMENTS OF PERSPECTIVE—I

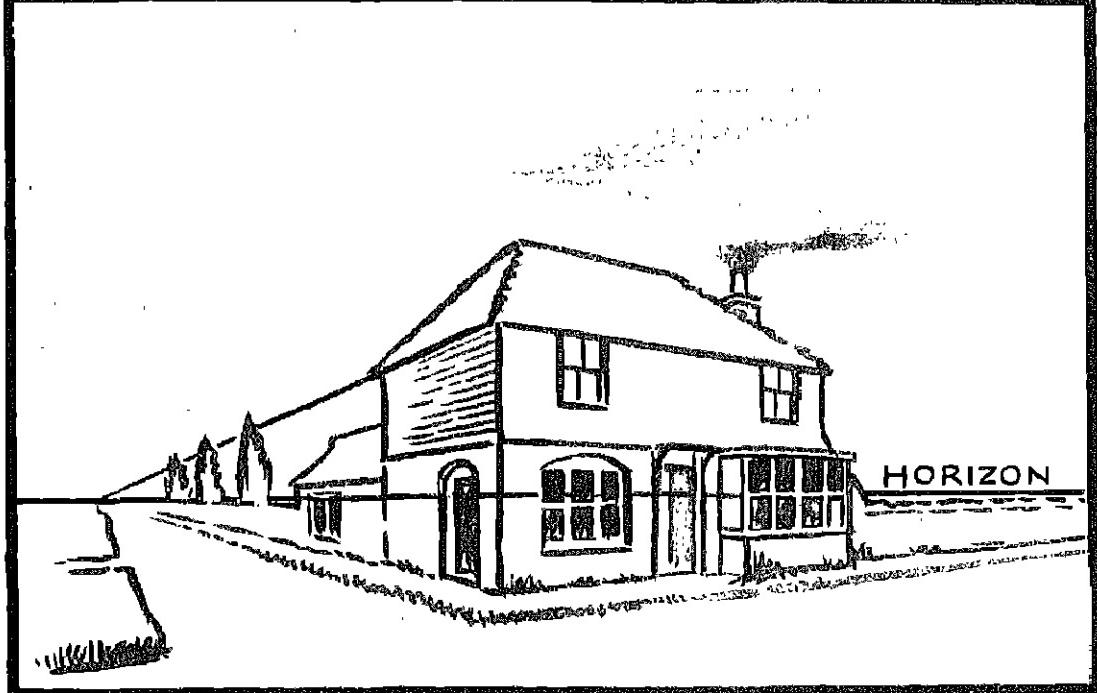
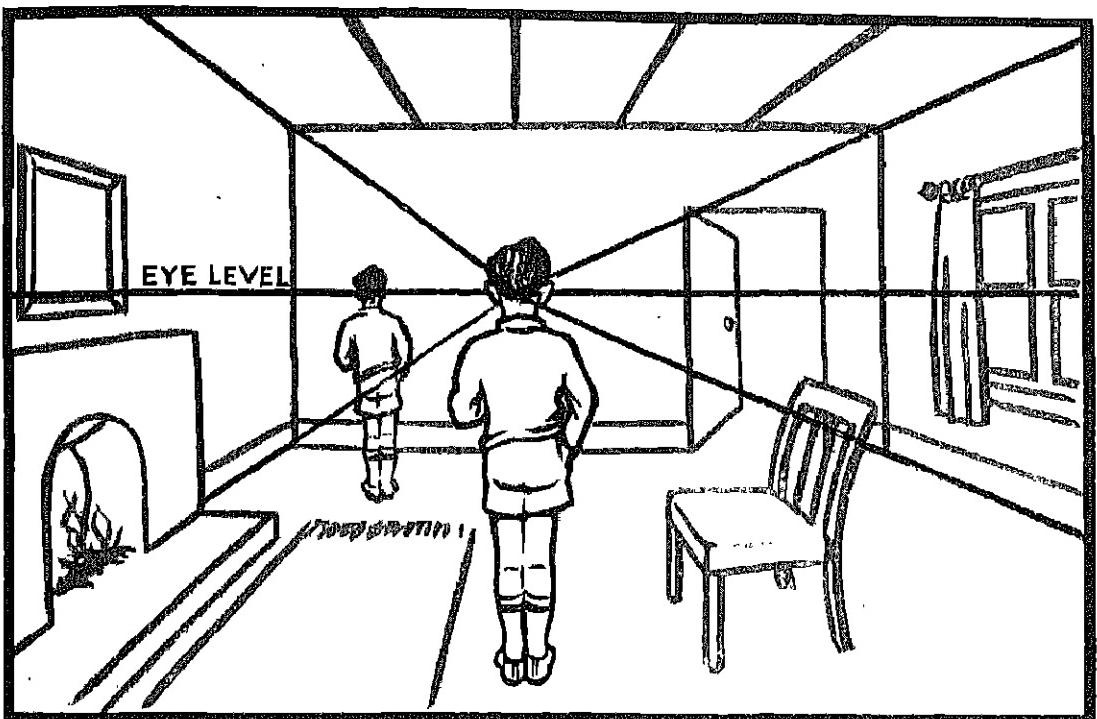


PLATE LI
APPLICATIONS OF THE ELEMENTS OF PERSPECTIVE—2

Whichever method the teacher may adopt, the elements of perspective should be made clear to the children as being a part of their illustration work. Perspective should not be taught in the senior school as though it were an abstruse science, to be preserved in

a watertight compartment of the syllabus, and having no connection with the free expression work.

Examples of the application of these principles to illustration are shown in Plates L and LI.

LINOLEUM-BLOCK CUTTING AND PRINTING

THIS is the most useful of all the school crafts which may be practised in the ordinary classroom, where facilities are not available for work which requires a great deal of apparatus and material. It is the most valuable craft because it brings into play all the varied knowledge gained in the ordinary art lessons. If a special crafts room is available for this work, or if the art room is fitted up for craftwork as well, its value is all the more enhanced.

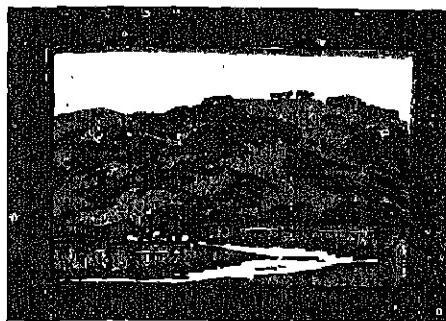
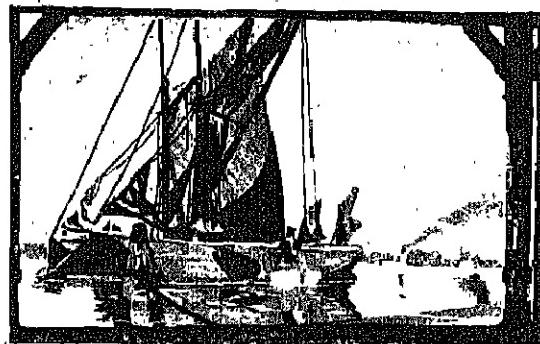
The craft has a wide range of application, for the blocks may be used for the production of all-over patterns for bookcrafts work; patterns for fabric printing; monograms and devices for notices or book decoration; illustrations for hand-written books which are bound by the children; illustrations in black-and-white which may be mounted and framed as pictures, or illustrations in colour for decorative and pictorial purposes. Class Picture No. 131 shows some of these applications of the craft.

Quite apart from this basis of usefulness, the linoleum-block print acts as a test of all the previous knowledge gained by the children. The success of a design depends upon the correct use of counterchange between the black and white areas; the planning of the design as a composition within the definite boundary lines of the block, thus introducing the various elements of design which have been referred to already; the extreme simplification of form, and the

avoidance of detail; the selection and placing of forms to give correct balance of light on dark, or *vice versa*. In the case of colour prints, the scope of the teaching is much wider. Each design has to be finished in the rough, on paper, after which it must be analysed in order to decide upon the number, shape and colour of the separate blocks which, when partly over-printed or superimposed, will give the same results as the original sketch.

Materials.—These are very few, and very easy to obtain. The linoleum should be of the smooth-faced kind having a plain surface, and should be about $\frac{1}{8}$ in. to $\frac{3}{10}$ in. thick. It may be had from the artists' colourmen in ready-cut blocks of 6 in. by 4 in., or 7 in. by 5 in. in size, and upwards; or it may be had from decorators and shopfitters, as waste pieces are very often obtainable from them when this type of linoleum has been used for the flooring of shops and offices. "Cork" linoleums should be avoided as the surface is too open and crumbly for clean cutting or printing to be carried out with them.

Brushes.—These should be flat hoghair, from $\frac{1}{2}$ in. to 1 in. wide. The bristles must be both short and stiff, and the best type of brush for the purpose is the one known as a "poster artist's" brush. The best substitute for this is the ordinary flat paste brush, of the kind usually supplied to schools and having fairly stiff hair. The common



LINOLEUM BLOCK PRINTS IN COLOUR
(Class Picture No. 131 in the Portfolio.)

stencil brush, or painting brush, is useless, as the hair is so soft that it is impossible to brush the stiff colour on to the block without it being scraped off by the edges of the printing portions.

Colour.—Specially prepared linoleum-printing ink is obtainable in a wide range of colours from the artists' colourmen. It is an expensive item, however, and the

ordinary tube water colours do very well instead. For black prints, the "ivory black" water colour gives the best results.

Paper.—Any absorbent paper will do for the early experiments. Typewriting or duplicating paper, cartridge paper or strong tissue paper may be used, providing that the surface is not smoothly "dressed." If printer's ink is used, however, the reverse

is the case, as the paper should have a glossy surface.

For all printing with water colour the paper should be dampened.

Japanese mulberry paper.—For later and more advanced work, and to get the best results, Japanese mulberry paper should always be used. Two qualities are obtainable from artists' colourmen; one comparatively cheap, and one which is expensive. The cheaper variety will serve admirably for all normal school purposes. This paper, made from the bark of the mulberry tree itself, has a fibrous texture which is most pleasing and which possesses high absorbent qualities, so that when it is damp, and a print is taken from a block on this surface, it gives a peculiar and very beautiful lustre and texture which is unobtainable by any other method of printing. By comparison, the "pull" taken off with printer's ink on a glossy paper appears to be harsh and mechanical, and lacking in artistic quality of texture, although the colour may be much stronger, sharper and more pure in value.

"*Baren*".—This instrument is used for applying the necessary pressure by which the colour is transferred from the printing surfaces of the block to the paper. It is an expensive item if it is bought ready for use, and consists of a circular pad, or coil, of strong cord which is covered with bamboo leaf. The pad, or baren, soon wears out, and it is this necessity for frequent replacement of the baren which makes this the most expensive item of the whole equipment.

An excellent substitute will be found to give good service in this respect, and all the prints illustrated in these pages were taken off by means of a small tin having a slightly convex surface at its base. The tin should be sufficiently strong to resist the pressure that is applied, and the curvature should be such that it enables the pressure to be applied to any unevennesses in the surface of the block without the paper being pushed on to the waste "ground." Fig. 6, Plate LII. An ordinary, humble

1 oz. "Capstan" tobacco tin satisfies all these requirements, and will serve admirably for all blocks up to 10 in. by 8 in. at no cost whatever, providing that the children are commissioned to collect them.

Method of preparing the block.—Most schools now possess special lino-cutting tools, but failing these an ordinary penknife may be used quite successfully if a short blade is included. A long-bladed knife is most difficult to use for the purpose. The only other tool which is needed, although it is not absolutely essential, is a carving gouge with which to remove the larger areas of waste from the parts of the block which are not to print.

The drawing is prepared to full size for the block which is to be used, and it is advisable to see that the printing parts are shaded or inked in, to prevent mistakes in cutting. This drawing may be made on tissue paper, after which it is pasted on to the block and is used directly as a guide for the cutting. In this case it must be remembered that the print will be in reverse to the drawing, so that, should any lettering be included in the design, it must be drawn backwards in the first place. Alternatively, the design should be traced through to the back of the paper, which is turned over before pasting on to the block.

A simple method for single blocks is to outline the finished design with a sheet of carbon paper underneath the drawing sheet. This gives the drawing in reverse on the back, so that by placing it reverse side uppermost on to the block, with a carbon sheet underneath, the design may be traced directly on to the surface of the block itself. The lines can be seen quite clearly, and if no registration has to be done for overprinting this method is quite satisfactory. It is, in fact, better for beginners than attempting to cut to a design which is on paper pasted to the block, as, unless the knife used for the cutting is very sharp, the paper will be torn up in places, even though it is apparently securely pasted on.

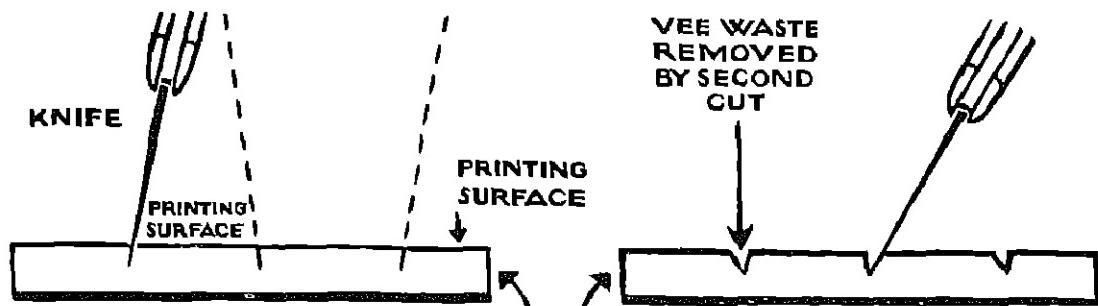


FIG. 1

FIG. 2

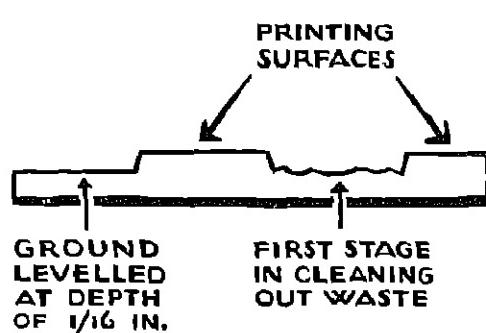


FIG. 3

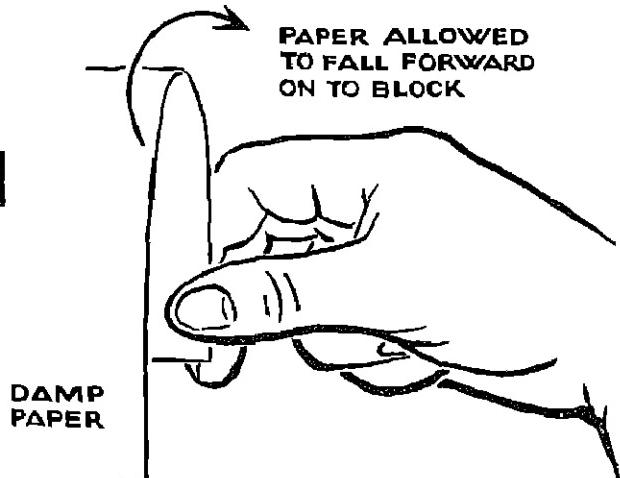


FIG. 4

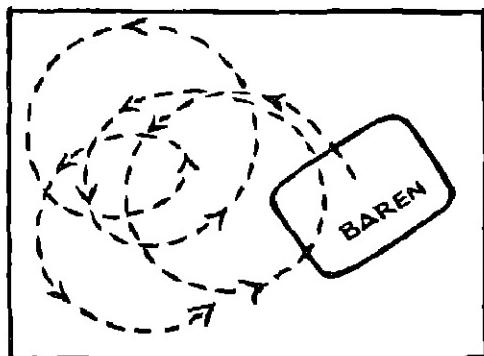


FIG. 5

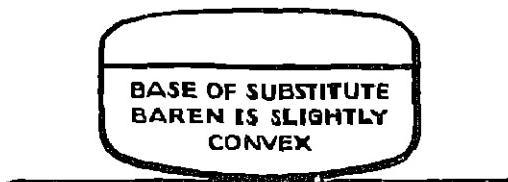


FIG. 6

The next stage is the cutting, and this is best done with a knife. Some teachers prefer to use tools which resemble the V-tool used in woodcarving on a smaller scale and which cut a trench along the outline of the design. Children find that this tool is difficult to use as it tends to keep "digging in." It is pushed away from the worker, in the manner of a graver. The knife, on the other hand, is drawn towards the worker and is much easier to control than the V-tool.

The first cut is made along the outline of the printing surfaces and at a slight outward slant, as in Fig. 1, Plate LII. This slant is to prevent the natural tendency which exists to undercut the outline whilst concentrating upon its direction. Any undercutting of the lines should be avoided as it weakens the walls of the raised surfaces which may crumble under the pressure of printing.

When the outline cut is completed a second cut is made, about $\frac{1}{8}$ in. away from the first one and sloping in towards it. This gives a V-trench all round the outline of the design, and this trench should be about $\frac{1}{16}$ in. in depth. Beginners always tend to cut too deep, with the result that the rough canvas of the backing of the linoleum is exposed, and, working up, becomes inked so that it spoils the background of the print. Fig. 2, Plate LII, shows the position of the second cut.

A small gouge, or a lino-cutting spade-tool, should now be used to remove the waste areas, this being done by a succession of parallel cuts which are followed by a second series at right angles to the first ones. This operation (Fig. 3, Plate LII) should clear the background to an even depth without exposing the canvas. Very fine angles or sharp corners should be avoided in the design as these cannot easily be cleared out. Similar forms should be avoided on the printing surfaces as they will crumble or break away during the printing. This fact marks the essential difference between the linoleum block and

the wood block. On the latter it is possible to obtain very fine lines from which to print; of such fineness that they may appear as hair lines, whereas such lines could not be printed from a linoleum block. Therefore, the typical wood block design is much more delicate in appearance as regards line strength, although, of course, such linework is not always necessary to the design. The linoleum block, on the other hand, should be bolder in design, so that where lines are necessary they may be made of a suitable strength. In any case, long and unsupported lines of any degree of fineness should be avoided.

As the surface of the block is certain to be slightly greasy, it should now be lightly glasspapered with a fine paper such as No. 0, the paper being stretched over a cork "rubber" or a piece of wood. The finger tips should not be used for the glasspapering as this practice will cause the edges of the printing surfaces to be rounded off to an extent which will spoil the printing itself.

Preparation of the Paper.—The next stage is the preparation of the paper. This must be evenly dampened to obtain both a good print and the peculiar lustrous texture which results from the partial absorption of the ink. One sheet, trimmed to a slightly larger size all round than the block, should be soaked in clean water, care being taken to see that no trace of soap is present. Two dry sheets are now placed on the wet one, which in turn is placed on an old drawing board. Then another wet sheet is added to the pile, followed by two more dry ones, and so on until the number required is reached. Another wooden board is placed on the pile, with a book or some other light weight upon it, and the paper is left thus, preferably overnight, for the sheets to get evenly dampened.

Printing.—When everything is ready for printing, a little ivory black water colour is squeezed out into a saucer or palette. No water is added, as thin colour will be scraped

off the brush against the edges of the printing surfaces and will cause a "blobby" print. Also, it will not be possible to obtain the full depth of tone which is necessary to the blacks. Instead of water, a little "Gloy" paste may be used to make the stiff colour workable, and a small quantity is put out on another saucer or palette.

The damp paper is left in the pile in a handy position, the top sheet being detached and left ready on the others, so that it may be picked up at a moment's notice. Speed in getting the paper on to the block is imperative, otherwise the stiff colour film will be dry before the impression can be taken.

The flat, hoghair brush is dampened, but must not be wet. It is worked into the colour so that only the end of the brush is fully charged with the stiff colour. Then it is touched only with the "Gloy" paste, after which the block is held with the thumb and finger tips of the left hand at the edges only, whilst the colour is brushed on by a series of parallel strokes, worked quickly but steadily from top to bottom, and then from side to side across the previous strokes. The brush must be held perfectly upright whilst the colour is brushed on, otherwise instead of the printing surfaces being inked the colour will be scraped off against their edges. For the same reason, the brush should be held lightly but firmly, without any great downward pressure.

Immediately the brushing is finished, the sheet of damp paper is taken up. It is held at the two bottom corners, one between the thumb and second finger tip of each hand, the sheet being allowed to fall back on to the wrists, Fig. 4. Plate LII. The bottom edge is then placed in position to the block, and the sheet must be allowed to fall on to the block, where it will lie quite flat. Do not try to place the sheet of paper flat on the block, as this will cause wrinkling.

A sheet of stout, dry cartridge paper is placed quickly on top of the printing sheet, to protect it and to allow of the rubbing to take place without its being torn up.

The tin, or baren, is picked up and the print is taken off by rubbing the baren over the area of the block, using a firm pressure and working in small circles as in French polishing, Fig. 5, Plate LII.

The dry covering paper is removed and the print is peeled off the block. The success or otherwise of the print may be gauged before this is done by lifting up the covering sheet and inspecting the back of the print. This cannot of course, be removed and replaced without spoiling the print, but, if the print is successful, the black areas will clearly be seen on the back before the print is taken off the block.

The print should be placed face down upon the board used for the remainder of the sheets, and each successive print is placed face down in this way upon the previous one. If the printing has been properly done they will not stick together, but will dry quite flat if left in a pile in this way and will thus be ready for trimming and mounting, or for insertion in a book. This is the great advantage which is possessed by water-colour prints over those done in printer's inks, as the latter must be kept separate for drying. This takes a considerable time, and the prints become curled, dog-eared and dirty in the grimy atmosphere of the average classroom.

Multi-colour blocks.—When more than one block is required to complete a design it becomes necessary to "register" each block from the original drawing. This adds considerable difficulty to the planning of the design and to the cutting and printing of the blocks. Two or more blocks should not be introduced in any one design during a first year course, and the details of these methods will be given in a later section of the whole scheme.

The first linoleum blocks may consist of units for repetition as all-over patterns. Plate LIII shows two patterns obtained by this method in which the unit areas are quite distinct. One is an exercise in cutting to given lines to produce a geometric type

of pattern (Fig. 1, Plate LIII) whilst the other unit is obtained by "free" cutting, without any preconceived idea as to the final result, Fig. 2, Plate LIII.

Plate LIV shows a number of patterns obtained by the use of these two methods but all based upon a square unit in the first place. The printing method is the same as that described above for pictorial or single blocks, with the exception that in the case of patterns it is, of course, necessary to place the block down upon the paper or material, so that the guiding lines may be worked to accurately. A baren, therefore, is not used for these, and as the area of the block is small it is not necessary. A good print may be obtained if the paper is laid upon a thick piece of felt, a pad of newspaper or blotting paper, or some other slightly resilient surface which enables every part of the surface of the block to be brought into contact with the paper.

Four pictorial subjects for single blocks are illustrated in Plate LV. It is interesting to note that Figs. 1 and 2 show the subject as picked out in white, on a black background. Beginners always seem to adopt this method, in which the subject matter is actually cut away from the block, leaving the background to be printed. Fig. 3 is really a subject outlined in white, whilst Fig. 4 is the only true linoleum print which is, strictly speaking, in the correct technique. In the early stages, however, it is not advisable to restrict the children to designing in this method only: they should be encouraged to experiment and to find out all they can about the possibilities of the medium for various kinds of design.

In subsequent work the best results will be obtained if the children are trained to think of all their suggestions for their first linoleum blocks as being in silhouette as

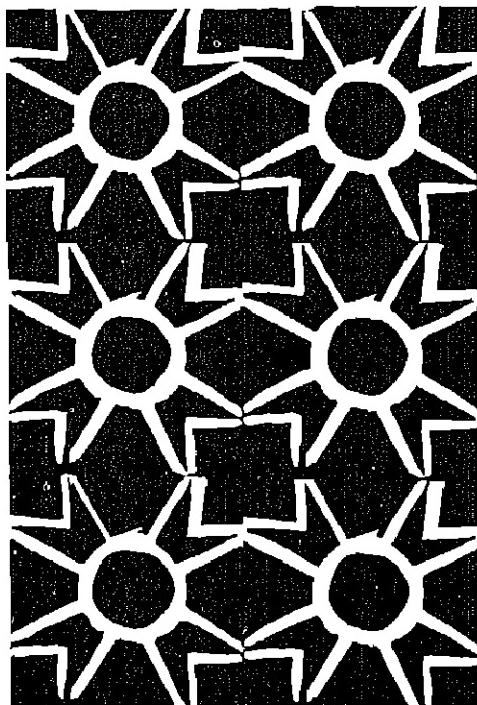


FIG. 1

PLATE LIII. UNITS FOR REPETITION

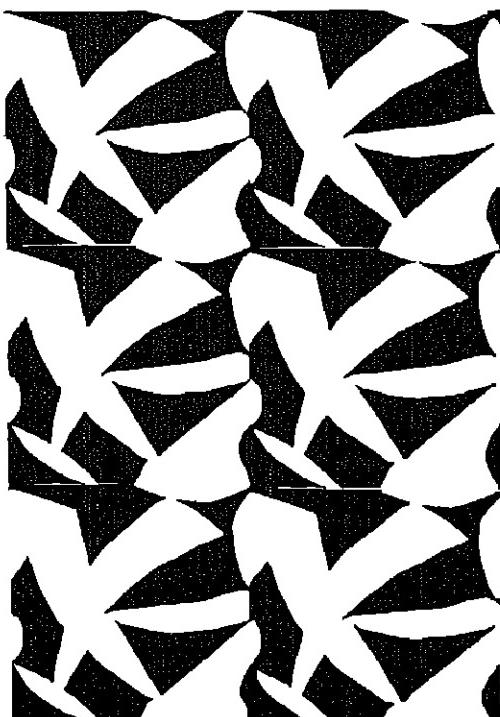


FIG. 2

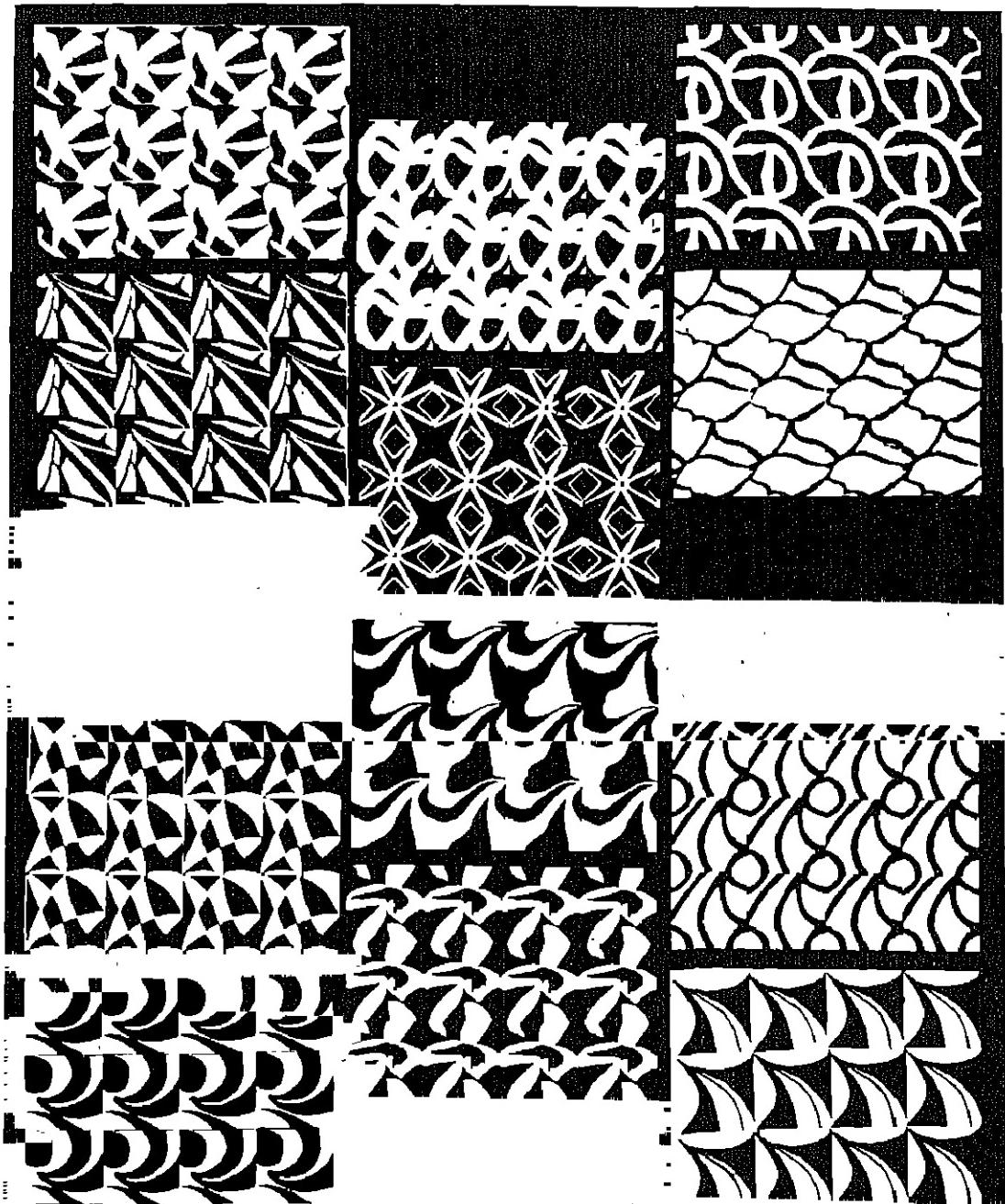


PLATE LIV. PATTERNS BASED UPON A SQUARE UNIT

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FIG. 1



FIG. 2



FIG. 3



FIG. 4

PLATE LV. PICTORIAL SUBJECTS FOR SINGLE BLOCKS

far as possible, and Plate LVI gives a selection of varied subjects arranged in this style. It is a method of approach which compels them to simplify all the forms that they use, so that they have the right outlook upon the work when they endeavour to carry out more advanced designs at a later date, and they will naturally adopt the same methods for such work without question.

Plate LVII gives a further selection.

These silhouette forms may be printed off for use as head or tailpieces for lettering, or as calendar decorations, or as ornaments for lettered rhyme sheets, etc. In many cases they will make very good all-over patterns units, which may be printed so as to alternate with other units of a different type, size and position.



PLATE LVI. SUBJECTS IN SILHOUETTE

MONTHLY SUMMARY OF FIRST YEAR'S COURSE

Note.—It is not intended to suggest that the following syllabus should be rigidly adhered to, but that it should represent a scheme of work of which the preliminary pages have explained the principles and methods involved.

September.—1. Preliminary lesson in the use of the pencil as an instrument for (a)

setting out designs; ruling lines for borders, or for lettering. Correct way of holding it to get an even line strength, whether fine or strong. Use of the ruler and set square for squaring-up drawings.

(b) For quick sketching, and to get a varied line strength for pictorial work.

These should be demonstrated by the teacher on the blackboard with a long piece of white chalk, the children making notes and sketches, line drawings, etc., on a 4-Imperial sheet of cartridge paper.

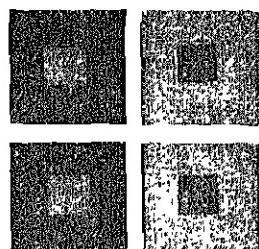
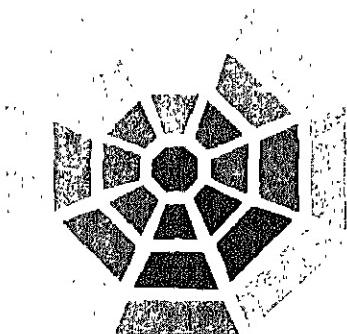
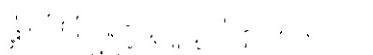
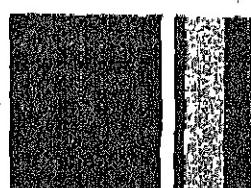
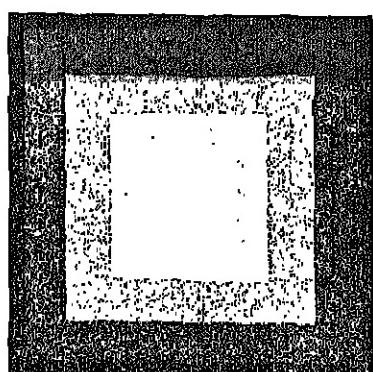
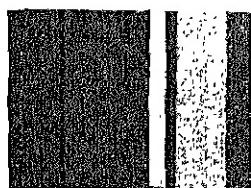


PLATE LVII. SUBJECTS IN SILHOUETTE

2. First lesson in the planning of an object drawing or an illustration. Three dissimilar objects of good but simple form to be arranged before a white background by the teacher.

The children draw three or four rectangles of the same size, in pencil. They draw the

objects, without detail and as freely as possible, in outline only, in the first rectangle and as they think fit. Advice is then offered by the teacher as to arrangement (without any technical terms), after which the children sketch in the same objects in the second rectangle.



THE COLOUR WHEEL

(Class Picture No. 133 in the Portfolio.)

The objects are now rearranged, still as a group, and the class sketches in the new arrangement in a definite endeavour to fill the panel correctly, so that the outlines of the outer objects meet the border lines of the panel in places. If time permits, a further arrangement within the frame may be tried.

These sketches must be rapidly made, with as few clear lines as possible, and no

shading. The aim of the lesson is to exercise the children in the use of the pencil for quick appreciation of general form, and the placing of the forms within a given area. Invariably, in the first attempt, the children will draw the objects very small, in the centre of the panel, so that they are quite unrelated to the border lines. The panels should be as large as possible, on the one sheet of paper.

3. During the period covered by the first two lessons, the children should have been given sketchbooks, with instructions to make sketches at home of a number of simple objects. This lesson consists of making a selection of any three of these, and re-drawing them as a group in one larger panel, using the same method in drawing. The trial arrangement of the selected objects should be made first of all in a smaller rectangle in one corner of the sheet of paper.

If time permits, the lesson may be extended by the addition, from memory, of some background detail to the finished group.

These drawings should be kept in a stiff paper folder, and they will serve as a groundwork for the first lessons in varying tone values, carried out in washes of black and grey on the white paper.

October—1. Colour.—The use of the coloured papers for the building up of the colour wheel, Class Picture No. 133. This looks best if carried out on either white or light grey paper. A $\frac{1}{2}$ -Imperial sheet should be used, and the wheel should be about 12 in. in diameter. It is best to use the un-gummed papers, the children pasting their own sections, as the ready-gummed sheets give trouble if any dampness has been present during storage. Plenty of newspapers should be provided by the children themselves, so that as each piece is pasted, another page may be turned over to ensure a clean sheet for pasting the next piece.

The setting-out of the wheel forms a useful exercise in itself.

2. The building-up and lettering, on the same sheet, of details from the wheel. (a) A column giving the tint, hue, shade and neutral from any one colour, in small squares.

(b) A double column giving the same from many two adjacent colours, with neutral and black.

(c) If light grey paper is available; one column giving black, neutral and white.

The opposite or complementary scheme is not introduced at this early stage, as it is unwise to risk confusion by too many details at once. The one-colour scheme and the

related scheme, with the purely neutral one, will give ample scope for all the first year colour exercises. Space should be left, however, for further additions at a later stage.

3. Whilst the above stages are still fresh in the minds of the children, the first experiments in simple colour arrangement may now be made. They will be needed immediately for simple design work.

A neat block of four fairly large squares is ruled up on a sheet of white paper, with a margin between each one.

The first one is covered with a single piece of neutral paper. The children then select any one hue as a starting point, and they cut out a band of black paper which is, in width, about one quarter of the side of the grey square. They mark on the grey square the position of the second quarter down from the top edge, and then paste the black band across the grey at this position, so that one quarter of grey appears across the top, above the black, and half the square of grey remains at the bottom. Next, a small circle of white is cut out, and this is pasted partly over the black, a little to the right of the centre, and partly over the grey ground, but at the lower edge of the black strip.

The second square is then treated in the same way by the children themselves, without direction, using any one hue instead of the white circle, and its shade instead of the black, on the neutral ground.

The third square is again covered with neutral, a shade being used instead of black, and its tint instead of white.

The fourth square is covered with any one tint. The shade of either of the two related hues replaces the black. The full hue of the ground tint replaces the white.

These four simple arrangements will be found to be of great help to the children in deciding roughly upon the quantities of the tints, hues, shades and neutrals which they are to use in their design work and pictorial exercises.

November—Pattern.—1. Although the first experiments in pattern design, using straight-



Fig. 1

Fig. 2

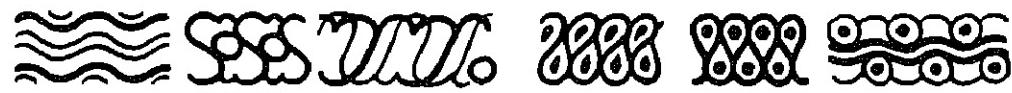
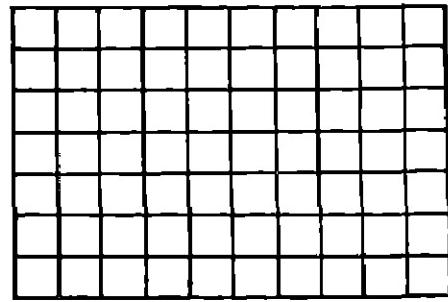
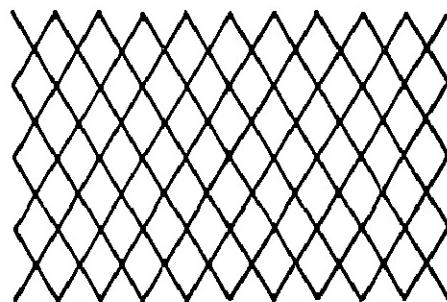
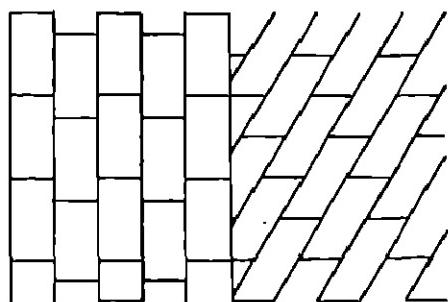
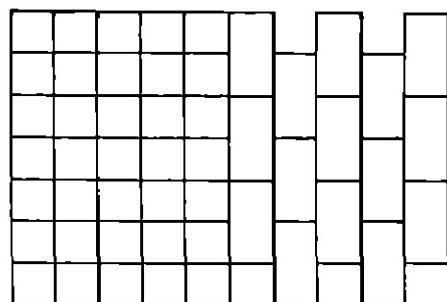


Fig. 3

Fig. 4



line arrangements, curved-line arrangements and combinations of both, should have been dealt with in the later stages of the junior school course, it may be found to be necessary to revise these details before going on to the further designing of all-over patterns.

Notes should first of all be taken by the children from blackboard demonstrations. Plate LVIII shows the various stages of this lesson, and the two subsequent lessons on this work.

Fig. 1 gives straight-line groupings which may form the basis for a simple pattern. In Fig. 2 variety is added by the introduction of another form of unit. Figs. 3 and 4 show the same application of curved lines and additional units.

The all-over pattern depends for its arrangement upon a scaffolding of lines, by which the units are disposed. The last four figures show the basic line arrangements upon which the patterns may be built up.

These line arrangements form the first exercise in the use of the principles of design mentioned at the beginning of the course, and illustrated in Plates XXXIV, XXXV, XXXVI.

2. A series of squares and rectangles is prepared, in which the children dispose units and lines to form patterns, using the notes of Lesson 1 as a guide. Plate LIX shows the progress of the work at this stage.

3. Using the range of water colours for flat washes, which conforms to the coloured papers already employed, and referring to the exercises in colour already completed, the children apply similar colour schemes to the patterns obtained in Lesson 2 above. For such small areas it will be found that two or three minutes spent in demonstrating the method of applying a small, flat wash will be sufficient for the class to carry out this operation after a trial wash on a piece of scrap paper. The technical methods of applying washes is left until a later stage.

As a test of what has already gone before, the children should be left to choose their own colour arrangements for these patterns.

If the Ostwald range of water colours is

not available, the children should be given only those water colours which closely approximate to them; e.g., crimson lake, ultramarine, Prussian blue, gamboge yellow, chrome yellow. By admixture of not more than two of these, and trial matching on scrap paper against the coloured papers, the intermediate hues may be approached without much difficulty. The obvious solution would appear to be to use the coloured papers themselves, but the building-up of small patterns with these is a tedious and difficult business. Also, it does the children good to experiment with their water colours in this way, before the instruction proper in painting begins.

December—Greeting cards.—1. All the children love to design and to produce their own Christmas cards, and sufficient ground has already been covered for them to do this without the necessity for relying upon the hackneyed themes of Christmas puddings and holly leaves. White and grey paper may be used in conjunction with the book-crafts lessons at this stage, and, as lettering has not yet been taught (unless it has been taken in a simple form in the junior department), the necessary wording may be neatly written in script or otherwise, as convenient. Decoration takes the form of applied pattern, not the all-over unit forms but the border type already dealt with.

2. This lesson will be a continuation of the previous one. It will not be possible to complete the greeting cards in one lesson only.

3. The next stage of the pattern designing may now be taken. Definite units are employed, which may be repeated in several ways. The small stencil plate, ruled to fit the guide lines of the pattern, and having only one unit cut on it, is the easiest with which to begin this work. If linoleum units or stick prints are available, they may be used as well, but the cutting of these will be found to be too difficult for first year children.

Attention should be given to correct spacing of the units to "fill" the ground properly, so that the total area of ground is about equal to the total area of units.

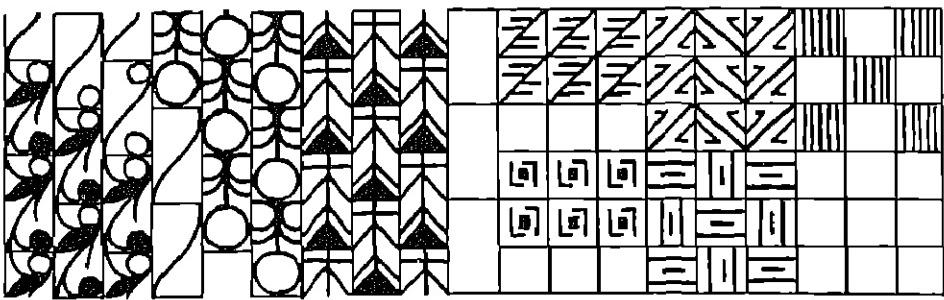
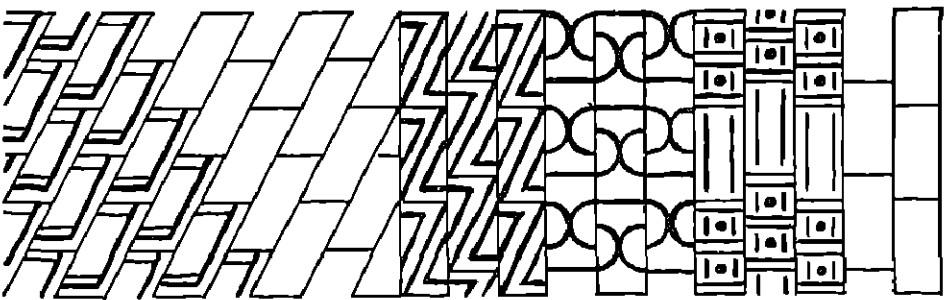
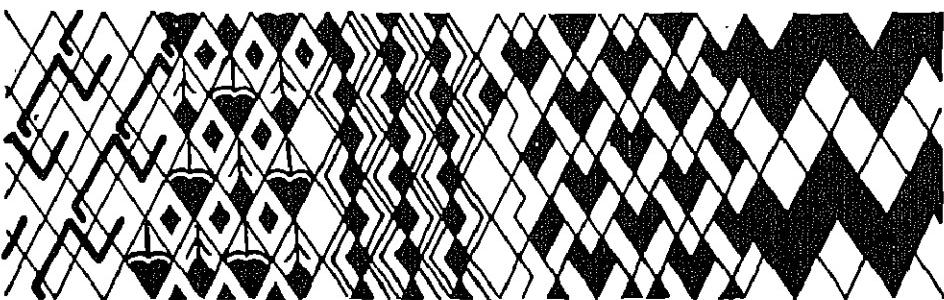
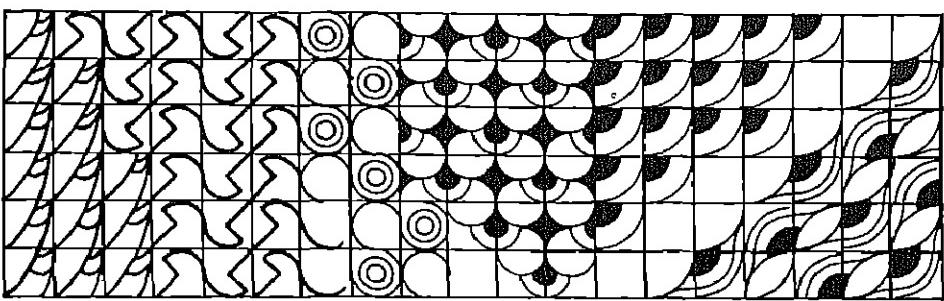


PLATE LIX. PATTERNS FROM SQUARES AND RECTANGLES

Application—to the bookcrafts work in progress at this time.

January.—1. Continuation of the elements of pattern design. The use of the "drop-repeat" unit arrangement, a "half-drop" being introduced first. The designing of abstract units, as distinct from geometric, or natural form units.

2. The "quarter drop" and the diaper arrangements. Full patterns need not be worked out in these styles until they are needed. Lessons 1 and 2 may take the form of notes and trial arrangements.

3. First lesson in lettering and writing. To enable the children to get accustomed to the "feel" of the pen or pencil for use in this work, so that their lettering may be freely drawn and may not be cramped in style (a common tendency with beginners), it is advisable to make the children draw the capitals and small letters to a fairly large scale, in pencil, and in single line at first.

Fine guide lines are necessary to give the children practice in writing and lettering to a given size. These should be ruled most carefully, and the whole alphabet should be grouped as a neat block on a $\frac{1}{4}$ -Imperial sheet of cartridge paper.

The capitals should be taken in this lesson, and the drawing practice may be combined with instruction in the correct proportions of the individual letters.¹

It will be found necessary to guard against the common error of allowing all the vertical strokes to lean in one direction or the other, and it is in the free drawing of these parallel strokes throughout the range of capital letters, combined with the circular strokes, that the children obtain such valuable drawing practice. The letters which give the greatest difficulty are the circular ones, the tail of the Q, the S, J, N, R and B. A chart is advisable for this stage, from which the children can work as accurately as is possible.

¹For details of this stage see Vol. IV., p. 555.

²Plate XXXVIII, on page 559, Vol. IV., shows the type of practice letters and strokes which should be attempted. The accompanying text gives descriptions of the methods of working and the formation of the various strokes.

February.—1. The small Roman letters should now be added to the sheet containing the capitals.

2. This lesson, in addition to the two previous ones, will be needed for the completion of a satisfactory sheet of lettering.

3. As it is not advisable to concentrate upon one branch of the work for too long a period, as the children tend to lose interest, this lesson may be devoted to free imaginative and memory work in colour. The only guidance to be given will consist of a few very brief notes on the blackboard concerning the size of the rectangle to contain the drawing; a reminder as to arrangement of the parts as in Lesson 2 (September), and a list of possible subjects which may either be set by the teacher or may be obtained by suggestions from the class.

If the progress of the class in the first lessons on colour was satisfactory, this lesson may include a test on that stage by allotting definite simple colour arrangements to different sections of the class.

March.—1. A return should be made to the lettering, as it is very necessary for this section of the work to be taken as far as possible in the form of continuous practice. An exercise in the arrangement of lettering, in varying heights, for a poster or a school notice will give excellent practice in the work of the previous lesson. An additional stage of the teaching includes the method of "blocking-in" the subject matter as shown, within definite boundaries but without distorting the individual letters. This always gives great difficulty to beginners.

The first lesson with the chisel-ended or manuscript pen is best taken at this time. Good lettering will not be expected at first, and, as this work requires long practice before a satisfactory standard can be reached, it is as well that the children should become acquainted with the implements and methods as soon as possible.² Before the specimen

sheet is begun, it is advisable to make the children practice the strokes on a piece of scrap paper, until they become accustomed to the feel of the pen and the method of forming the strokes. The serifs (the heads and tails of the letters) give them great difficulty at first, and it helps the children considerably if the teacher demonstrates the formation of these, and other difficult strokes, on the blackboard with the side of a fairly long stick of chalk.

3. At least two lessons will be needed for the early stages of the manuscript writing. Following, therefore, upon the practice sheet taken in the previous lesson, this stage may be applied to the bookcrafts exercises by the writing of labels for them. Full title pages and so forth should be left until a later stage. If labels are not needed for the particular course followed, some further practice in the ordinary lettering should be given in this lesson.

April.—1. As the time is hardly ripe for the analytical pencil drawing of natural forms, and a fair amount of ground has been covered in pattern design, object drawing and lettering, this is a suitable time for the first lessons on the elements of perspective. Details of the stages to be covered are given in Plate XLIX and notes should be made by the children on a large sheet of paper for future reference. Free use should be made of scrap paper for trial sketches during these lessons.

2. This lesson should be a continuation of Lesson 1, the children making freehand sketches of simple subjects on the lines of those illustrated in Plate XLVI. Colour should not be introduced at this stage, as it will tend to lead to confusion. The whole attention of every child will need to be concentrated upon the representation of the subject in as few lines as necessary, and without any distractions of shading, colour, etc.

3. The success or otherwise of the teaching in the two previous lessons should now be tested by setting the class a limited choice

of subjects for a free illustration, carried out in colour and with as little preliminary drawing as possible. The aim should be for the children to represent the subject so that foreground, middle distance, and background or distance is clearly suggested in each case. A small trial arrangement should be made on scrap paper, but not more than ten minutes should be spent on deciding this. Detail should be avoided and only the broad outlines of the forms are required. Here again, a specimen illustration will help the children to realise what is expected, but it should be removed before they actually begin work.

May.—1. The children should be instructed to bring specimens of suitable flowering plants to school for this lesson, unless they are available on the school premises. If necessary, some may be furnished by the teacher, as in town schools it occasionally happens that trouble occurs owing to the children raiding the local park for their specimens!

A $\frac{1}{4}$ -Imperial sheet of cartridge paper is used, and a careful, analytical pencil drawing is made which shows details of growth and structure of the plant, along with outstanding characteristics. The aim should be to obtain a clean but varied line strength, without shading, as illustrated in Plate XLIV.

2. A similar specimen being obtained, the previous lesson should be amplified by the addition of full-sized or enlarged details of the plant. These should be disposed round the central drawing, already completed, and should be carried out in the same style.

The sheet is finished by neatly lettering in pencil the title at the foot of the drawings. An inked title would look very incongruous and out of place on the page of pencil drawings.

3. Reference being made to the sheet completed in Lesson 2, a series of units, both single and compound, may be designed for future use by simplifying the characteristic forms of leaves, petals, etc., of the plant, or plants, which formed the subject for the

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previous lesson. This "conventionalisation" of the natural forms should not be carried to extreme lengths, but the children should realise that for certain types of design another field for the development of unit forms has been opened, as distinct from those of the geometric or the abstract types.

June.—1. The first instruction in the technical methods of applying water-colour washes is given now, as it may immediately be applied to the direct painting of flowers. These provide the best form of application as the areas to be covered are small; the colour must be clean; the painting must be absolutely "direct" and as far as possible in one wash only to preserve the purity of colour, and the children must learn how to work one colour into another in the one wet wash; how to wipe out small areas; how to soften the edges of a wash, and how to work with a fully charged brush. All these methods have to be taught more or less at once, by demonstration, the class following on scrap paper at first. The smallness of the washes enables the children to avoid the added difficulties that occur when large and clearly defined areas have to be covered, as in the case of a group of objects.

At this stage it is most important that the teacher should endeavour to impress the class with the "easiness" of this work, when it is freely handled with confidence. On no account should the children be given the idea that it is something extremely difficult to accomplish, as the success of their painting in all its forms will depend largely upon the degree of self-confidence with which they approach it.

Similar exercises for use on a larger scale will be referred to during the second year lessons.

2. The trial washes having been completed during the previous lesson, the children should now attempt the full-colour painting of a suitable flower and leaf form, using the same methods. The flat wash, the blob, the graded wash and the variegated wash will

all be employed in this exercise. No preliminary pencil drawing should be used, beyond the faintest outline of the general masses which may act as a guide to the direct painting.

These washes are illustrated on Class Pictures 136 and 140.¹

3. The water-colour sketches of Lesson 2 having been disposed upon the upper half of a large sheet of cartridge paper, the lower half of the same sheet is completed during this lesson by making an analysis, in colour, of the scheme composing the flower and leaf forms already finished.

The children should be led to notice that the various hues, tints and shades present in the subject are not equal in area intensity. Therefore, when making the colour analysis, they should be encouraged to endeavour to represent these various differences by subdividing a square, for instance, in an irregular manner as for an abstract unit, so that proportionate areas may be allotted to the individual washes. This method gives the children a much better idea of the natural colour scheme than is obtained by colouring a column of equal-sized squares, the common method of carrying out this particular exercise.

The children should check the results of the analysis with their notes on simple colour schemes, and on the colour wheel.

Suitable flower forms for these exercises are the nasturtium and the fuchsia, having strongly marked colour areas, with suitable foliage. The earlier daffodils are not recommended, as the grey shade and shadow tones are extremely difficult to obtain without the yellow being "dirtied" in appearance. Roses are far too difficult for these exercises, and should never be attempted by beginners.

Naturally, at first these shade and shadow areas will give great trouble as regards colour matching. Correctness can be approached but cannot be insisted upon at this stage, and some advice as to the colours to be used for "running in" with the original wash should be given by the teacher.

¹ See also Vol. IV., pages 493, 495, 497.

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Crimson lake, vermillion (middle), chrome yellow (middle), yellow ochre, cobalt blue and Prussian blue will give all that is required for the flower forms mentioned above. Many teachers object to the use of Prussian blue, and Antwerp blue may be used as a substitute for it.

A list of useful colour mixtures is given on page 113.

July.—1. The sketchbooks should have been checked at intervals, and a fairly large collection of sketches of all kinds should now be available for use in illustration work.

This lesson may take the form of allowing the children to use the stock of sketches for a free illustration. They may have the choice of subject, individually, but the drawings should be carried out by brushwork alone.¹ This method of working will compel the children to adopt a bold, free style, without unnecessary detail, which will exercise to the full their powers of memorisation and observation. The training so received will be invaluable in their later poster and illustration work.

2. The results of the previous lesson will be extremely varied. Some good drawings will be obtained, some will be moderately good, but the majority will probably be disappointing. The children will realise many of their shortcomings without knowing why they occur, and it is unwise to leave them in a dissatisfied state of mind.

This lesson, therefore, should be a continuation of Lesson 1. The teacher might take a selection of the drawings made which have been done on a fairly large scale. The best ones should be pinned up on the blackboard, or, better still, on the mounting board used for reference drawings and reproductions, thus leaving the blackboard

free for demonstration of the points which arise.

The good points of these drawings should be shown to the class, along with suggestions for further improvement of them. The same method should be adopted with the moderately good drawings, and with the bad ones, the teacher's attitude being one of kindly criticism (nothing destroys the confidence of the children more than sarcasm or destructive criticism, and, after all, most of them will have made a sincere effort).

A rearrangement of the old drawing may now be made, or a fresh subject may be attempted, the advice just given being kept in mind. Rough trial sketches may be made on scrap paper for the teacher's approval or otherwise, after which the new and full-size drawing may be carried out very rapidly. It is essential to insist on speed, as the results will be better and there is not the same danger of the children losing the "impression" they are trying to portray in a mass of unimportant detail.

3. If time permits; the first year course may be rounded off by a test carried out on similar lines to those of the last two lessons, but in which the subject is set by the teacher. This should be of such a nature as to include the early principles of object drawing and perspective which have already been dealt with. The results will be of great value to the teacher in determining the exact nature of the second year lessons of this type.

Sketchbooks.—A list of subjects should be set for practice in sketching to be carried out during the holiday period. The children should understand that this list represents the minimum that will be expected of them in this work, and they should be advised to make as many additional sketches as possible.

¹ See Vol. IV., pages 513, 523, 525, 527.

SECOND YEAR

WATER COLOURS

MANY teachers prefer to retain the Standard Ostwald water colours for the teaching of colour theory only or for decorative work in the flat. In that case the ordinary range of water colours is used for the more advanced work in illustration, sketching and object drawing, the children having first "located" these colours in regard to their approximate position in relationship to the colour wheel, as indicated in Plate XLII.

For this purpose, a lesson should be devoted to the taking down of notes by the children in their folio of reference sheets, already mentioned, and colour notes should be made in addition to the written instructions. A list of simple rules and useful colour mixtures would be given, as follows:—

Rules.—1. Work on a sloping board.

2. Think out exactly what you are going to do before you start.

3. Use a full brush.

4. As far as possible run the colours together on the paper instead of mixing them in the palette. This will ensure purity and variety of colour, instead of a dull and possibly muddy wash.

5. Once the colour is on the paper, leave it alone. Working it about kills the "bloom" and leaves it dirty and lifeless.

6. Paint the picture as a whole, not in separate pieces.

7. Begin with the light and warm washes of yellows and light reds, and carry them all over everything except the high lights, which are left white paper.

8. Providing a full brush is used, soft lights can be wiped out immediately with a clean, damp (not wet) brush. Or, another colour can be run in to merge with the first one. Or, the first one can be wiped

off in part, and run in another to remain pure but to merge with the first one at the edges.

9. Either work as in No. 8 above or else wait until the washes are quite dry. Never attempt to work on a "sticky" wash that is half dry.

10. When the first wash is dry other washes may be run over it or "superimposed" upon it. These will be the darker, or the colder, colours, as the case may be. If they are pure they will form "colour greys" by allowing the first wash to show through and to influence them. In the case of the raw or cold colours, such as green and blue-green, this is called "qualifying" them, as they are brought into the key of the whole painting by thus being made to harmonise with the other warmer colours.

11. Never use more than three washes if you can help it; that is, the first wash with two superimposed washes. Otherwise the colour will "lift" from underneath the last one and will become muddy and lifeless. Therefore, the last of the washes should be small and should be put on like blobs, very lightly. These are known as "accents", and they are placed where small, deep, cast shadows and similar notes of strong colour and tone occur in the picture. They should be the finishing touches, and should be used very sparingly.

12. If any part of the picture is too harsh or too strong in colour or tone, it may be washed down when it has dried thoroughly. This is done by stroking the parts firmly with a brush full of clean water only going once over each stroke and working across, from side to side, with regular and parallel strokes until the whole area has been covered once. The surplus water collects at the bottom of the area being washed down, and is removed with a damp, clean brush. This operation removes some of the colour from

the previous wash and softens the hard edges that sometimes occur between adjacent washes, although it is not always desirable to remove these edges.

Colour mixtures.—Certain water colours are definitely opaque in character, even when they are applied as a single clean wash. These should be avoided when it is desired to mix a transparent wash for superimposing on other colours, or when a clear, transparent mixture is needed for a colour-grey. These opaque colours are: chrome yellow, vermillion, cadmium yellow.

Semi-opaque colours: cobalt blue, yellow ochre, ultramarine blue, viridian. These may be used, with care, for most mixtures.

Transparent colours: Prussian blue, light red, crimson lake, gamboge yellow, indigo blue, burnt sienna.

Other pigments, not likely to be used in school, are not included here.

The colours are roughly classified as "warm" or "cold" in character, and a safe rule is that mixtures should be made from either one group or the other. Intermixing of warm and cold colours will generally result in a muddy wash. For certain purposes, however, such mixtures may be made deliberately, and the semi-opaque colours may be mixed with the transparent group for many of the greyed washes.

Useful mixtures.—A light pearly grey, approaching neutral, but run on to the paper as a broken-colour wash and not as a plain flat wash: cobalt blue, crimson lake, gamboge yellow. To get a broken-colour effect the colours should be run in together, but stirred gently with the brush only for a moment. The mixing is only partly completed when the colours are washed on the paper.

Other colour-greys; produced in the same way, and very useful for sky effects: cobalt blue, light red, yellow ochre; or ultramarine blue, crimson lake, gamboge yellow; or indigo blue, crimson lake, gamboge yellow (for dark, clean greys of deep tone).

Indigo blue, brown madder and yellow

ochre may be used where a wider palette is available for more advanced work. The last two mixtures are especially useful for deep-toned backgrounds for object drawing, still-life groups and flower paintings.

Green mixtures.—These always give the most trouble to beginners who tend to make them too "raw" and unqualified. The usual wash of green, representing a field or the foliage of a tree, is too metallic and harsh in intensity, as very few children or students of water-colour painting realise the extent to which the "green" parts of a landscape, or other subject, are greyed by the atmospheric conditions; the influence of distance and of adjacent colourings.

Prussian blue, which is most commonly used for this mixture, is a pigment of great coldness and intensity, and it should be used with discretion in mixing greens. The same caution is needed in the case of Antwerp blue and indigo blue. The latter is immensely powerful and intense.

A greying and qualifying influence may be had upon the Prussian blue by using a warm and semi-opaque yellow such as yellow ochre. This colour is already partially greyed, and is tending towards orange. Thus it has the effect of toning down the Prussian blue, relieving it of some of its harshness.

These points should be noted in connection with the following mixtures:—

A clear, bright "spring" green: gamboge yellow with a touch of Prussian blue.

Grass green: gamboge yellow, viridian, with a touch of yellow ochre. Yellow ochre, Prussian blue, with a touch of burnt sienna.

Light foliage greens: yellow ochre and gamboge yellow, Prussian blue, with a touch of burnt sienna.

Dark foliage greens: Prussian and ultramarine blue, yellow ochre, burnt sienna. Indigo blue and burnt sienna may be substituted for small, extreme darks.

Foliage grey-greens (reflecting the sky colour or light): cobalt blue, crimson lake, yellow ochre. Or, cobalt blue, and gamboge yellow alone for the lightest parts.

Foliage greys, shadows and shade: French ultramarine blue and vermillion (mainly for accents, and floated over the greens).

In all these mixtures the burnt sienna should be used very sparingly, as it is a very "hot" colour and is unpleasant if used in excess.

For the shade areas on yellow flowers: cobalt blue, crimson lake, gamboge yellow. These greys on yellow petals are most difficult to get as they must be absolutely pure and clean. For this reason it is best to run them in with the original wash. If they are superimposed they invariably look muddy and dirty.

Paper.—Cartridge paper is excellent for school painting purposes in water colours, although it goes yellow after a time. It is absorbent, but it permits of washing out of parts needing softening or alteration. It gives granulation in every wash floated on with a full brush, a quality which should be aimed at in water colours and which is obtained by the separation of the particles of pigment deposited by the drying wash, allowing the clean, white paper to show in between them and thereby giving the maximum richness of colour.

The "not" surfaced water-colour papers are expensive and very difficult to use. They demand the most direct form of painting, and they allow of no mistakes as the washes are absorbed immediately. Hard edges cannot easily be softened. In fact, it is necessary for beginners to stretch the paper on a board, by soaking it and gluing it round the edges to make it dry flat and to stretch it, after which it is re-damped so that the work takes place on the damp paper. This prevents the washes from being absorbed at once, and renders them more "workable." For these various reasons it is best to keep to cartridge paper of a good weight and quality.

Brushes.—Sable brushes are the best for water-colour work; as it is unlikely that

much pure water-colour painting will be done except in the last year, it is worth while getting a sufficient number of good brushes for one class. Sizes No. 3 and No. 8 will do all that is required normally; the round type should be chosen as they hold more colour than the flat brushes and they come to a good point.

If these brushes are prohibited on grounds of expense, there are now several good substitutes on the market; but on no account should camel-hair brushes be used for serious practice work. They have no resilience; they will not keep their shape, and do not come to a good point.

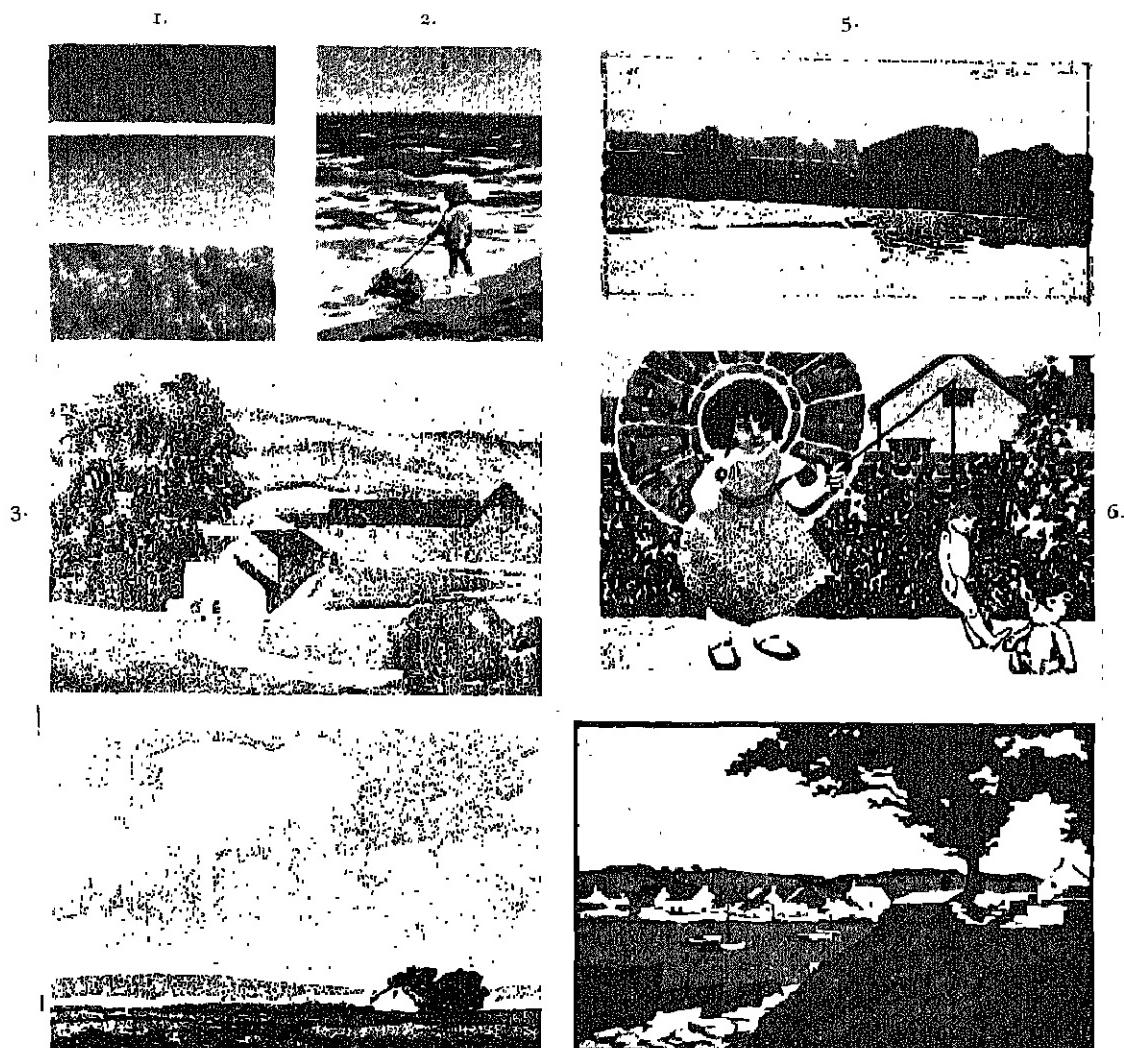
Method.—Class Picture No. 140 shows examples of the various methods mentioned above, which are used in direct water-colour painting. Other methods such as the use of paste colour, stippling, etc., which come more within the scope of the professional artist, are not included as it is considered wiser to concentrate upon the straightforward technique of pure water-colour painting when teaching senior children, in view of the limited time which is available for this class of work.

In Class Picture No. 140, Fig. I shows the three fundamental washes used in painting in water colours. They are carried out as described above in the rules for painting, and practice in applying these washes is usually the first stage in the teaching of the art.

The first one is the flat wash, in which the whole area is covered with regular strokes by a full brush of colour to obtain a perfectly even tone throughout.¹

The second wash is the graded one, in which the same method is used but in which each successive stroke is made with the brush containing a little more water added to the colour. Thus the tone is gradually weakened as the wash proceeds, the rate of weakening, or the area covered by the wash from full tone to white paper, depending upon the amount of water which is

¹ The method is shown in Vol. IV., page 492.



WATER COLOUR METHODS
(Class Picture No. 140 in the Portfolio.)

added at each stroke. This type of wash is used for sky effects and for rounded objects on which both colour and tone are continually varying. *Note.*—Other colours may be added in this way as the wash proceeds, a touch at a time in addition to, or instead of, the water.

The third example shows an exaggerated instance of the broken colour or variegated

wash. In this case the colours are run on irregularly, being allowed to merge together by light touches of the brush. For strongly coloured washes the colours should be put separately on the paper with a full brush, the brush then being used to merge them together. For light-toned washes, such as the pearl-greys in sky sketches, the brush should be dipped once in each of the colours

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ready mixed for use, so that it is charged with all of them without their being mixed in the palette. A stroke is made on the paper, which mixes the colours only partially, as for a flat wash. Then the brush is cleaned by being dipped into water, the surplus moisture being flicked off. It is then dipped again into each of the separate colours in succession, and the next stroke is made on the paper. The method is repeated until the wash is finished, when it will be found to possess a transparency and colour bloom which cannot be approached by any other method. The same colours superimposed as a series of flat washes would give an entirely different result, which would be a dull flat wash of near-neutral.

Fig. 2 on the same Class Picture shows the use of these three washes for a rapid impression of a simple scene at the seaside. This is the kind of sketch that the children should be encouraged to try to carry out as part of their illustration work. Very little preliminary drawing is necessary, and the whole sketch is practically finished in one wash, only a few touches of stronger colour being required to finish it when the first washes are dry.

A careful preliminary pencil drawing is made for Fig. 3 which shows the first washes used for building up a landscape sketch. Warm colours and light tones are used throughout, so that a few small superimposed washes, followed by the accents of small cast shadows, will complete the sketch.

A finished sketch carried out in exactly the same way is shown in Fig. 4. The greyed colour of deeper tone in the foreground, suggesting a roughly broken surface of varying colour, is obtained by superimposing a strong broken-colour wash over a similar one of light, warm colours. The sky is carried out in one wash only, and the only colours used for the sketch are yellow ochre, Prussian blue, cobalt blue, crimson lake and vermillion. The yellow ochre which forms the basis of the first wash all over the sketch is allowed to show through as

much as possible. In some places it is untouched; in others it has a superimposed wash of flat colour, and in others it qualifies a superimposed wash of broken colour: but it influences the whole sketch and ensures a certain amount of colour harmony throughout the painting. This device is known as "pulling the painting together" and is best effected by arranging for one colour to be dominant throughout the sketch.

The next example (Fig. 5) is done with a very large and fully charged brush on an absorbent ground such as cardboard. The board should be tinted grey or cream. As it is immediately absorbent, each wash or stroke must be absolutely direct in its application, and the colour retains its bloom and richness by being undisturbed. Practice in painting quick effects on surfaces of this type assists the children to acquire a good style of painting in which they have to work rapidly but with their minds made up as to what they are going to do next. It is a useful method for obtaining certain effects such as a misty landscape or figures, objects, etc., in a half-light in which the details are not clear and sharp.

Fig. 6 illustrates what is probably the best and easiest method for the children to adopt in the early efforts at imaginative illustration. The main parts of the illustration are planned in the manner recommended earlier on, and a pencil sketch is made which includes only the main forms and lines. The colour washes are almost entirely in the flat, and they are of considerable intensity. This simple method gives a semi-decorative type of illustration which appeals to the children because of the ease with which it may be done and because of the bright colour which they find attractive. The method is suitable for story illustrations and for small decorations such as those which appear on rhyme sheets in conjunction with lettering.

The last illustration on Class Picture No. 140, Fig. 7, is carried out entirely in body colour; i.e., colour which is entirely opaque but which is still water colour. It is a

design for a landscape poster and represents the type of work up to which the cut paper designs should lead. Although it is realistic as to subject, the treatment is decorative in style, every part of the painting being carried out "in the flat," and this style should always be adopted for poster work. It is the lack of decorative treatment which spoils so many of the poster designs attempted by children, as many of them show that the fact has not been realised that poster technique is quite different from that of the ordinary sketch.

In addition to a planned composition and decorative style the poster requires a definite colour scheme. The one shown is a "double-split" complementary scheme, which means that it consists of two opposing colour schemes, each of which is related to the other but which is reversed in balance, so that a large area of middle tone and greyed colour belonging to one scheme is related to a small area of intense hue which belongs to the second related scheme. Each scheme, however, contains its own opposites which, in turn, are similarly related to one another.

This type of scheme is the one most commonly used in the ordinary pictorial work, and those students of colour work who are interested in following up the bare elements of colour theory which are given in this course should refer to the excellent textbook of Cyril Pearce entitled *Composition* and published by Messrs. Batsford of London. It is a difficult scheme for children to learn and to put into practice, but it is useless to expect them to produce good colour work in illustration and poster design unless they have had the progressive series of exercises leading up to this and similar schemes. As the benefits of such instruction are not limited to painting alone, this is, in the opinion of the writer, the final argument in favour of definite teaching of colour theory principles.

Decorative designs of the type shown in Fig. 7 are best carried out in poster colour, ready prepared in jars. Ordinary water

colour may be used if it is mixed with either Chinese white or, better still, zinc white. The drawback to the addition of the Chinese white is that it makes all the mixtures very "cold" and chalky in appearance, besides giving an unpleasant shiny surface to the colours. The poster colours on the other hand dry with a very pleasant matt surface; they are easy to handle and to apply, and retain to the fullest extent their warmth and depth of tone.

Further applications of these methods.—These may be seen in the illustration of object drawing in water colours which are given in Class Picture No. 136. Further reference is made to details of the methods adopted on Page 183.

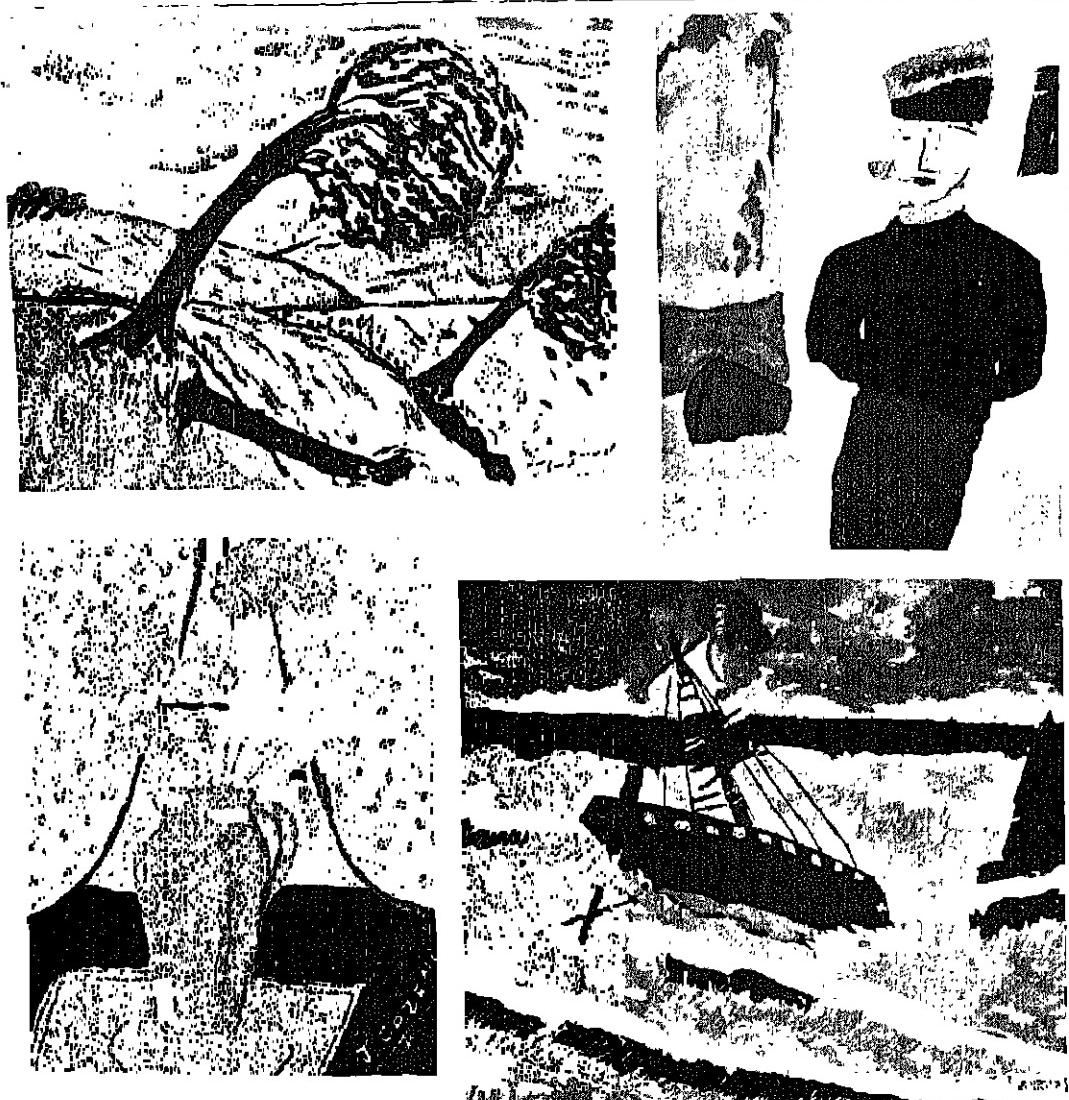
ILLUSTRATION

During the second year of the course the illustration work and imaginative and memory drawing are carried a stage further towards the final aim of the production of poster designs, book jackets and book illustrations in the form of linoleum cuts.

This stage is utilised as a means of giving further definite training in the principles of pictorial composition, outlined at the beginning of the first year course. A certain number of "free drawing" lessons will be interspersed with the lessons used for definite training in drawing composition and colour arrangement, and in this way the expression drawing of the junior stages is utilised and carried on throughout the whole course in a really progressive manner.

Method.—It is strongly recommended that the second year illustration work should be taught in a systematic manner by a series of lessons which will culminate in one standard example. This may then be used for reference purposes in all the later work.

No progress will be made without some definite instruction which will carry the work beyond the first year stage, as the children are still unaware of the means by



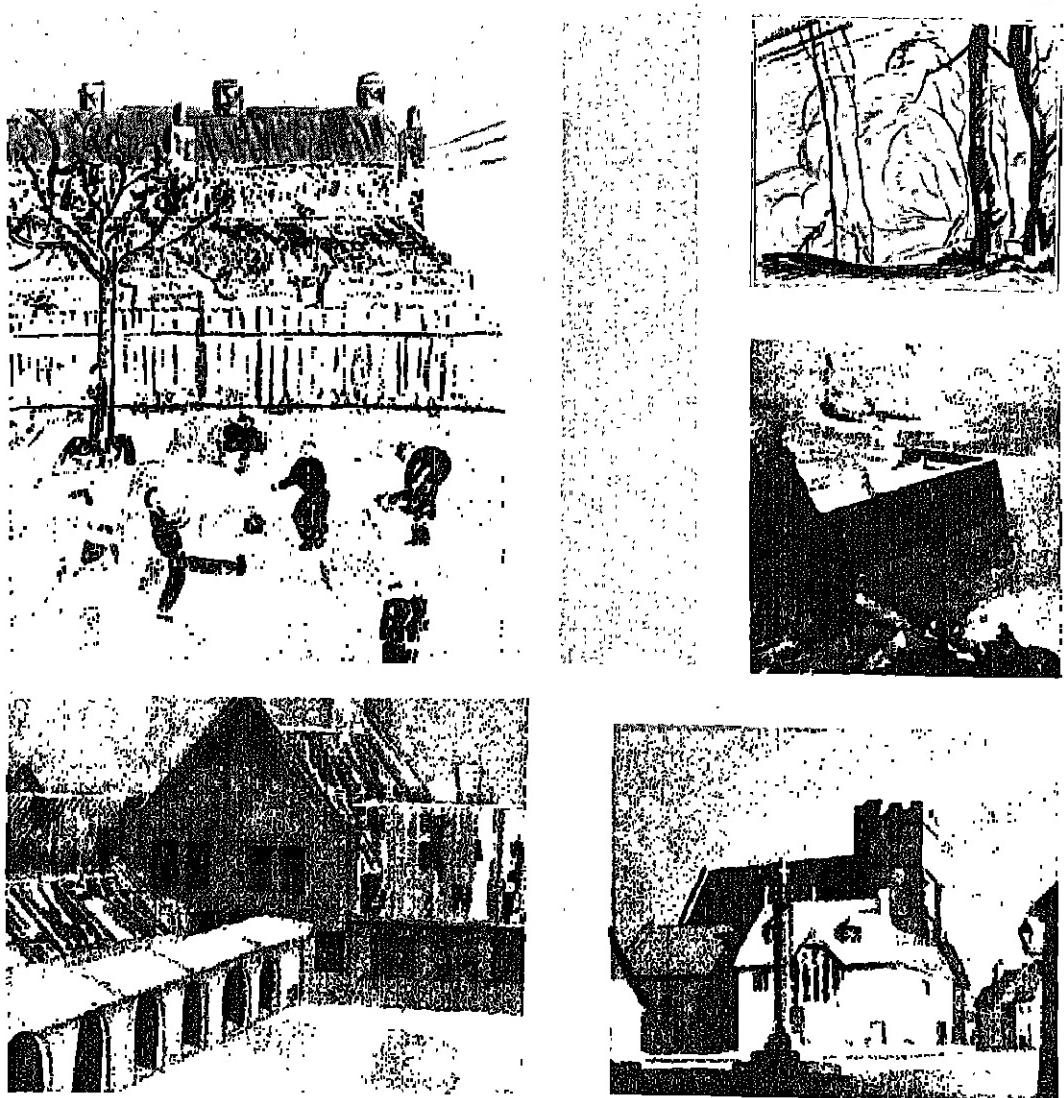
CHILDREN'S ILLUSTRATIONS IN WATER COLOUR AND BODY COLOUR
(Class Picture No. 131 in the Portfolio.)

which the knowledge they have already gained can be co-ordinated.

Plate LX shows the stages by which the work progresses from the first rough sketch to the finished composition. This method is already being used in many schools with great success. Fig. 1 is the typical prelimin-

ary sketch as made by the child for a subject such as *The Toy-shop*. It contains all the ideas relevant to the subject and many which are irrelevant, all placed within the bounds of the picture area but without any ordered arrangement.

Each child should make an attempt which



CHILDREN'S ILLUSTRATIONS IN VARIOUS STYLES
(Class Picture No. 135 in the Portfolio.)

is entirely original upon a large sheet of cheap paper. The best of these attempts, probably consisting of half a dozen drawings, should be pinned up before the class at the start of the next lesson; if they are large enough, they can be seen from the back of the class.

The teacher should discuss these drawings with the class, pointing out the unnecessary details and asking the children for their own suggestions as to the essentials which are to be included in view of the definite title of the picture. These may be noted on the blackboard.



FIG.1

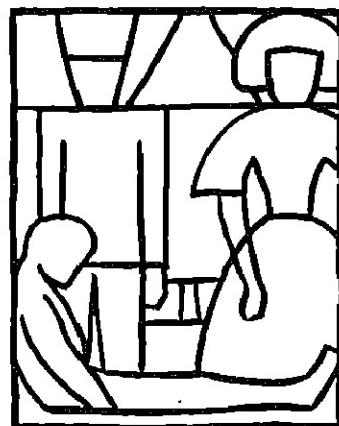


FIG.2

PLATE LX. SUBJECT: THE TOY SHOP

Fig. 1: The child's original drawing.

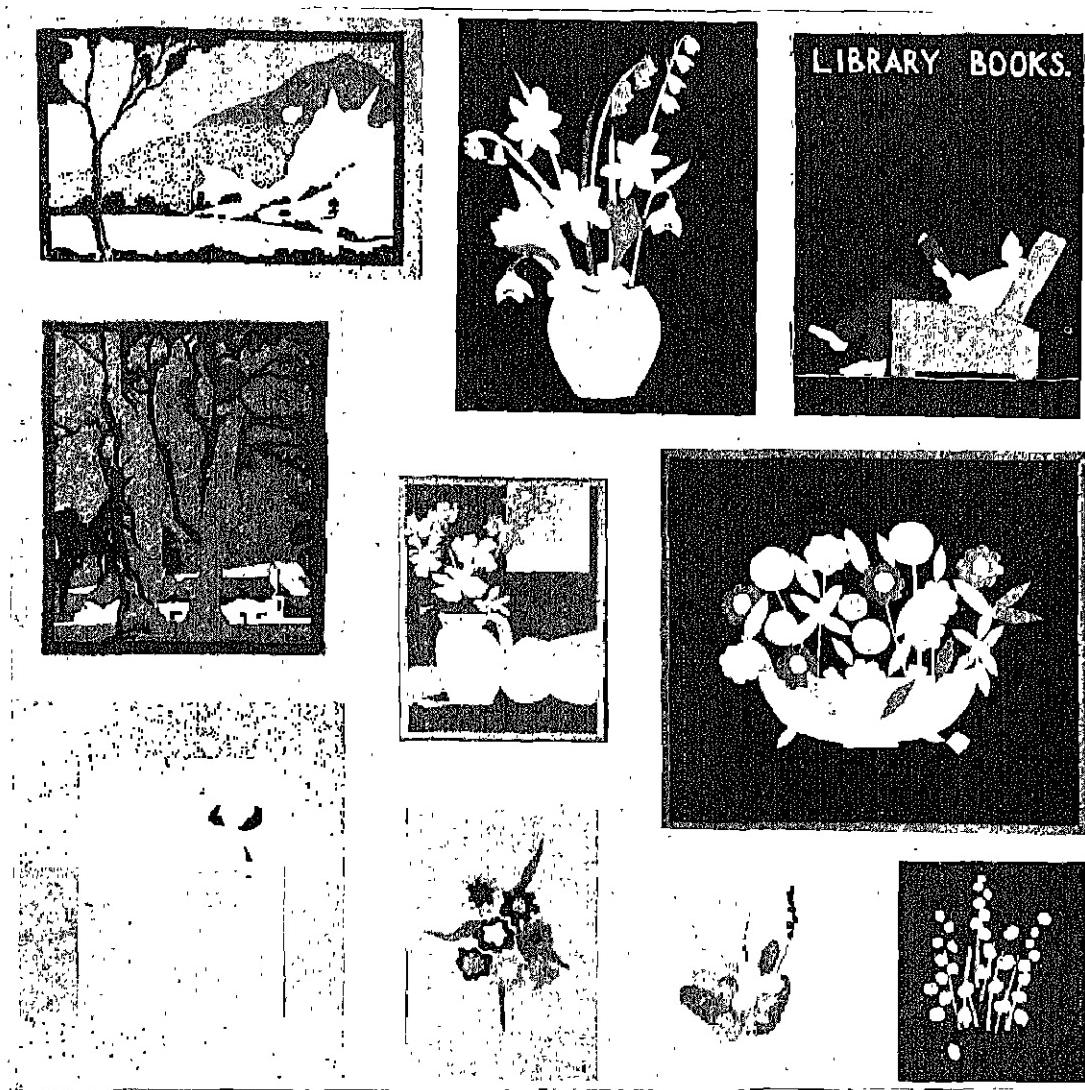
Fig. 2: The essentials rearranged, after discussion.

On left: The final illustration in coloured papers.

Next, the teacher should draw on the board a large rectangle of the proportion required for the illustration. Suggestions may be asked for as to the disposal of the essential details within this rectangle, the children referring to their notes made in an earlier lesson. Only the main lines should be included. The progress of the work at this stage is shown in Fig. 2, Plate LX.

When the final form of the picture has been decided upon, the children draw the picture

afresh on a new sheet of paper, using the blackboard diagram as a guide and adding only the necessary amount of detail. This finally decides the composition, which has been planned to occupy the given rectangle as an abstract pattern of main lines and varying forms, both large and small. It should be pointed out to the children that although the subject has suggested these forms and lines, they have been placed within the rectangle to a plan which is largely irres-



CUT PAPER ILLUSTRATION WORK
(Class Picture No. 132 in the Portfolio.)

perspective of the subject. In the case shown (Fig. 2) the general tendency of all the main lines is at right angles to one another and in keeping with the bounding lines of the rectangle. The picture, therefore, makes use of the principle of opposition throughout its structural lines, and this principle is also the basis for Plate LXI which is produced by the same method, and of several illustrations

in Class Picture No. 132, in which a number of similar examples are shown in colour.

Having, then, the subject planned as a suitable composition, it is a fairly easy matter to convert it to a colour scheme. Strictly speaking, the colour scheme should be considered as a part of the composition, and at the same time. But it is wise not to attempt too much at once in this standard exercise,

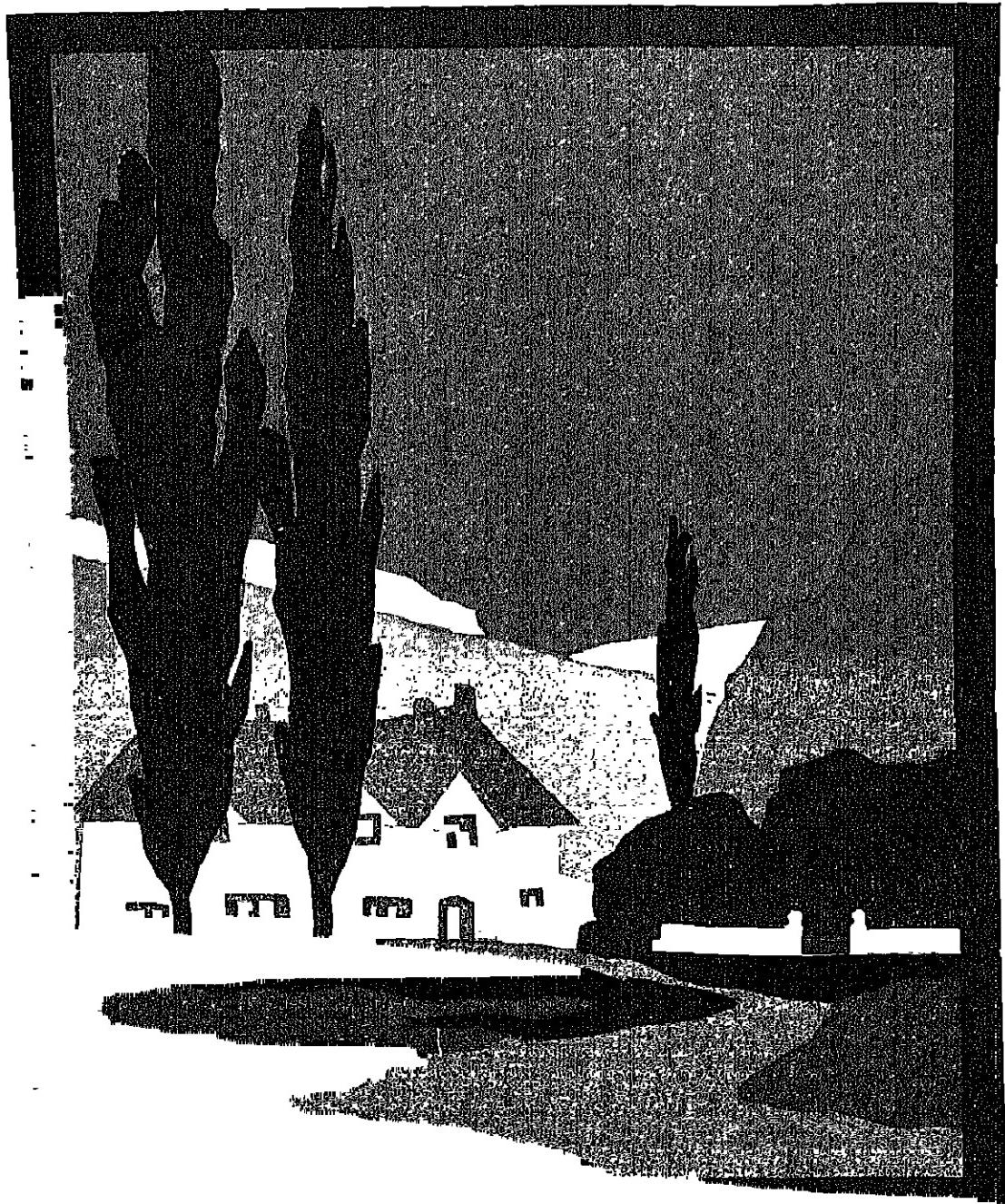


PLATE LXI. CUT PAPER ILLUSTRATION

so that the question of the colour scheme may be taken in another lesson.

Each child is allotted a different hue in rotation, so that every ninth child has the same one to start with. A starting point within the picture is fixed in every case, after which the children work out their own schemes based on the allotted hue.

Revision is made at the start of the general principle that the strongest and most intense

Picture No. 132. In a simple way it makes clear to the children the manner in which the colour areas are enhanced by the "mount" of surrounding and intermingling neutrals.

The general effect is striking and attractive, if somewhat crude, and these designs should be regarded as posters. In their composition and treatment as flat areas of strongly contrasted colour and tone, along with the

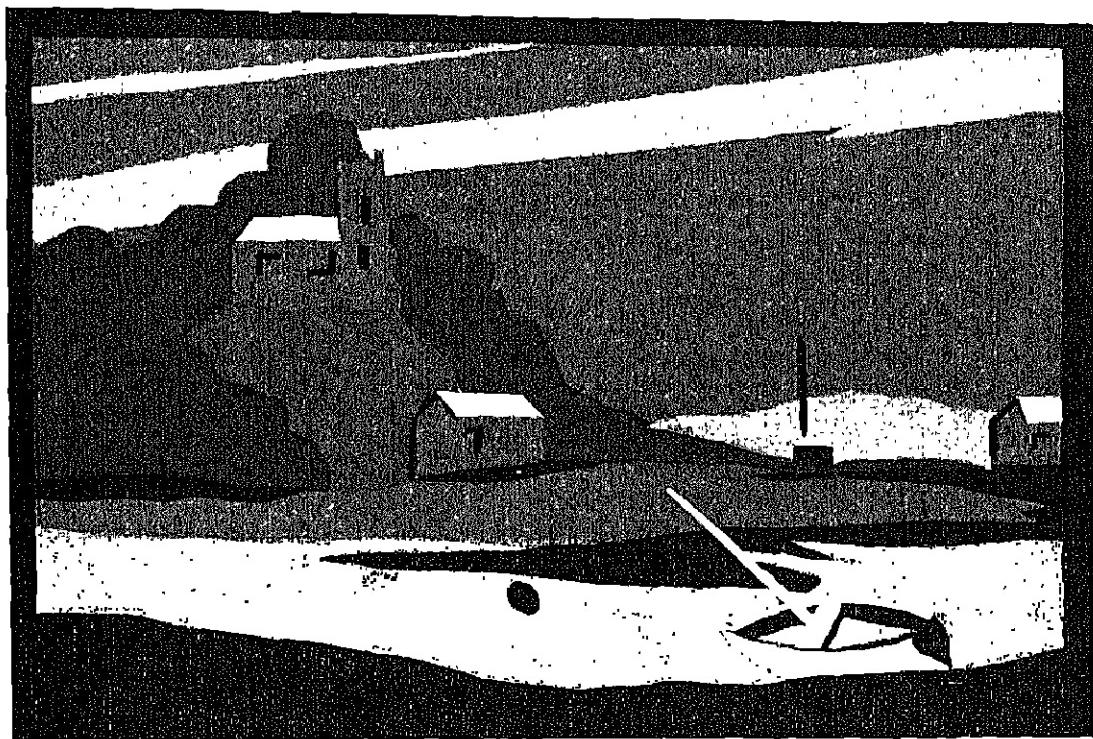


PLATE LXII. CUT PAPER ILLUSTRATION

hues are kept for the smallest areas. The larger areas consist of either tints or greyed colour (shades), whilst a portion of the design is deliberately left neutral. For this purpose a grey pastel paper is used for the background of the design, so that the neutrals may be obtained by leaving the ground paper untouched in parts. Plate LXII shows a further instance of this method.

The effect of this convention is seen clearly in the examples shown in colour in Class

omission of all unnecessary detail, they conform to poster technique. The value of this stage of the course will appear when, during the third year, the children design posters and book jackets with at least some little idea of what they are attempting to do.

Application.—The children should be encouraged to experiment with the use of neutrals in their ordinary illustration work,

in which they will take the form of the colour-greys mentioned in the text dealing with water-colour methods on pages 113, 114. Pastel work may now be attempted with some hope of success, as it is done on a neutral ground with touches of bright colour. The study of good reproductions of suitable pictures may be begun, and analysis should be made of the composition and colour scheme in each case. The same use of neutrals should be applied to the designs for craft work of all kinds. Neutrals are supplied by the natural colour of "crash" and similar materials; by grey wool and felt; by grey cover papers as used for book crafts, and by greyed book-binding cloths and leathers.

Materials.—All the examples shown, both in Plates LX, LXI and LXII and in Class Picture No. 132, are carried out in paper. The reason for this is that the use of the same range of coloured papers as that employed for the first colour exercises compels the children to make use of their notes on simple colour schemes. It compels them to work "in the flat" throughout, in the decorative style suitable for posters, and it ensures that the correct range of hues, tints and shades is being used. In addition, the use of the papers enables the work to be done much more quickly and cheaply than would be the case if body colours were being used.

The only other accessories that are required are scissors, rulers, and tracing paper. The ungummed papers are recommended, as they are easier to store and to work with. A stiff paste such as "Grip-fix" is the best, as the areas to be pasted are mainly small ones and this paste will not cockle up the papers in the way that a thin paste such as "Gloy" would do.

In building up these poster designs from the original drawing, the largest area of paper is laid first and is carried right across behind the other detail. In succession, then, the remaining areas are pasted on partly over one another, the last ones being the isolated spots and accents which are placed

on top. In this way, the parts of the design are overlaid, which makes the building up of the picture an easy matter. The children should not attempt to fit them together like a jigsaw puzzle.

LETTERING

Hand-drawn lettering and manuscript writing is a most important part of the school art course. Its varied application both to other forms of art and to the crafts gives a sound training in many aspects of proportion, balance and restraint in design, whilst the practice necessary for the acquisition of a good style of lettering forms a sound course in draughtsmanship.

The first stages in the teaching of lettering in the senior school are given in Vol. IV pages 554 to 559. These deal with the origins of the Roman alphabet as we know it, and with the method by which the letters may be grouped for the first practice in drawing them with the pencil and pen. Plates XXXVI, and XXXVIII show, in addition, the methods of forming the various strokes and serifs, and the correct manner of holding the pen.

Very often the instruction stops at this stage, with the result that good lettering is never achieved by the children although they may be able to form perfectly the individual letters of the alphabet. The most difficult part of lettering is the "packing," which needs skill in obtaining continuity of the written words and a sense of appreciation of the balanced page. Beginners invariably cramp the lettering in one line to keep it within the limits set by the margin, and extend the next one to reach these limits. This gives an uneven appearance to the "block" of lettering composing the page, paragraph or notice as the case may be, and creates the impression that there are definite gaps in the lettering.

At the same time that the children are cultivating an easy, flowing style of lettering they should be instructed in the methods of planning the page. The same principles will apply to the placing of the lettering upon a

poster, a title page, a page of text in manuscript, or a panel of low-relief lettering which may form a part of a plaque or other project in wood.

The margins of the page are just as important as the lettering itself, and they serve the same purpose as the mount for a picture. There are various kinds of marginal arrangement to suit different styles of work and different styles of lettering, but in every case the "weight" of the lettering should be taken into consideration. "Weight" in lettering does not refer to the size of the letters themselves, but to the packing and spacing of the text, and the compactness or otherwise of the page.

During the second year of the course a certain amount of facility should be acquired in the stages mentioned above, so that the lettering may be applied in conjunction with the bookcrafts course. At the same time, the place of lettering in the general design course may be studied by practice in the simpler arrangements of poster design and advertisement "lay-out." The latter form of application gives excellent training in abstract design in conjunction with decorative work in the flat for posters, and with the more advanced pattern and pictorial work. But most of this form of application of the lettering will be dealt with during the third year.

Building up pen forms.—Plate LXIII gives the strokes which build up the last fifteen letters of the small Roman hand.

With the exception of *t* which comes just above the line, the ascending and descending strokes in this writing are two-thirds of the height of the body of the letter.

The construction of the head of an ascending stroke requires careful analysis. The letter *l* is built up with two strokes. First is a minute broad horizontal stroke. The second is vertical, finishing with a minute broad turn. The tiny broad stroke is made first and the pen is taken off and put back on this stroke with its edge on the top edge of the stroke and about one-third of the

way up; then it is drawn directly down, finishing with the minute broad stroke.

The small vertical strokes have three directions. The heads and feet of these strokes must be small and as angular as possible without being actually in the squared form. The verticals can easily develop into weak curves. They are carefully spaced to give an evenness of line and space to keep the rhythm.

When the construction of a letter is being learned, it is better to write it in each way once only. A habit of drawing lines several times to improve them is usually disastrous. It means that less attention is given in the beginning to the analysis of the strokes, and the sight of several badly drawn letters gives a feeling of incompetence.

It is best to write only a little at a time and as carefully as possible—two or three letters, a word and one or two borders and no more.

The words which are written should be made up of letters which are easy to draw and attractive to look at. *S* is a most difficult letter. It is as well to understand it, draw it carefully and then leave it alone as much as possible. Any letters which are badly drawn are inclined to make the writer lower his standard, which should be kept as high as possible at all costs.

If the lettering is done with an easy hand, both the squared and rounded forms should show the broad strokes drawn carefully parallel and the thin strokes parallel. Both should show an evenness of line and space, and a rhythmic, pleasant quality. If the pen is pressed it is impossible to get the same quality in the writing.

When the construction of the alphabet is followed and single words are written easily, two short lines of writing can be done to get the swing and rhythm which give a general evenness of effect over a larger space.

The distance between the lines of writing is determined by the height of the descending and ascending strokes which must not touch. They can vary in height. Edward Johnston gives the usual distance apart of writing lines about three times the height

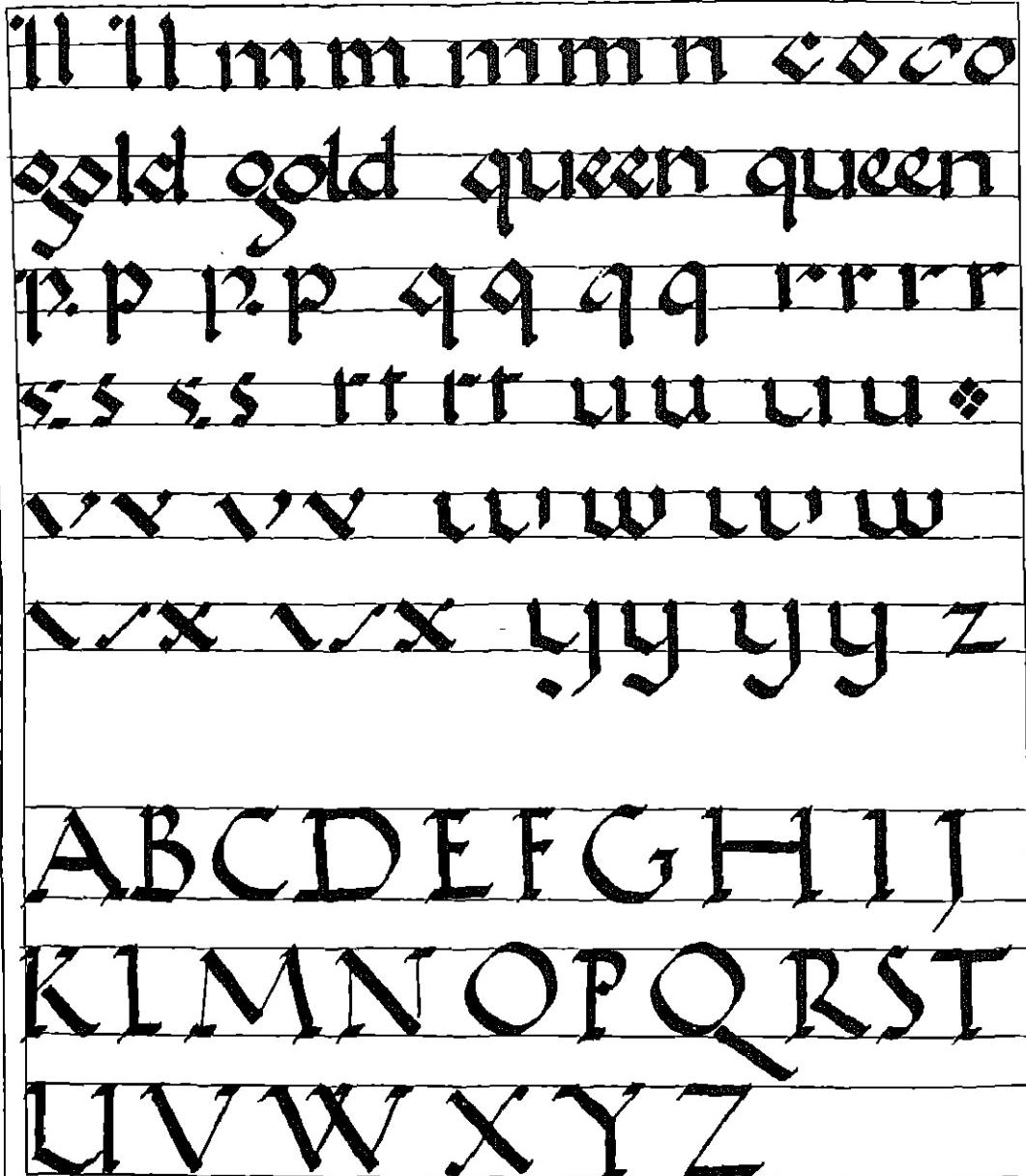


PLATE LXIII. LETTERING WITH A CHISEL-ENDED PEN

These capital letters are not simple to draw, as the heads and feet require great care, but it is as well to know the correct method of drawing this type of letter

of the body of the letter, in which case the ascending and descending strokes would equal half the height of the body.

Plate LXIII shows some pen-written capitals.¹ They are less easy to draw than the small round hand and it is just as well,

The value of lettering.—Plate LXIII shows easy ways in which the use of a manuscript pen can be understood and the construction of the letters realised. The letters are not intended to be models, but to introduce the early formal small hand.

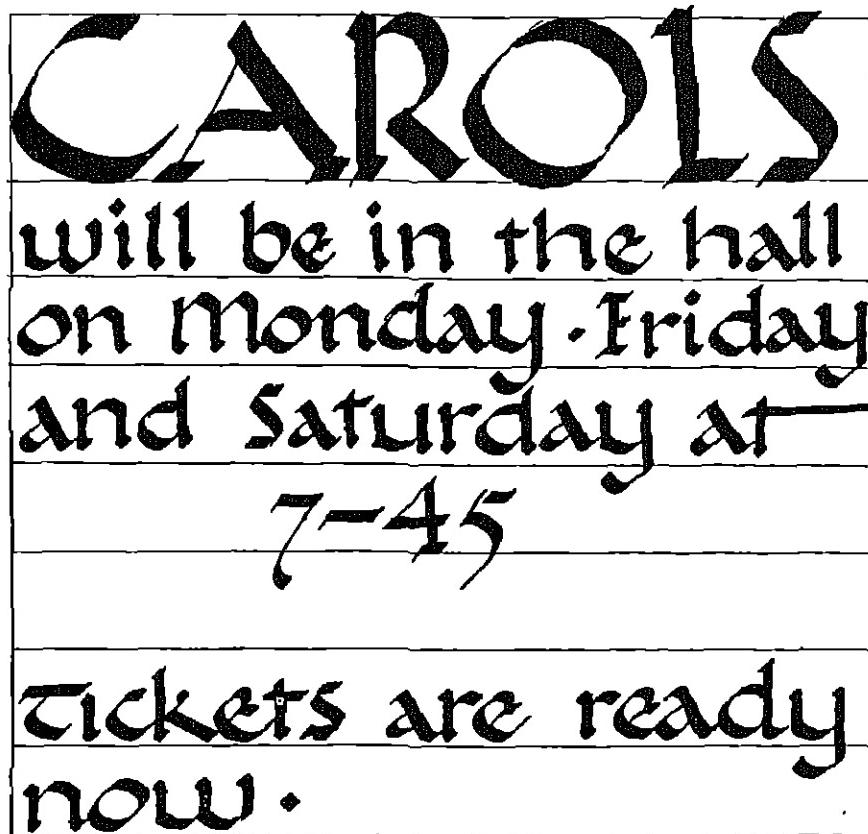


PLATE LXIV. A NOTICE IN FORMAL WRITING

The notice on this Plate has been placed high on the page in order to make an attractive block. The words have been written and arranged to give an even effect, while, at the same time, important words have been brought out so that they can be seen at once.

at the beginning, to use them only as they are required. They can be drawn on the line and equal in height to the small Roman *b*. The heads and feet or finishing strokes should be small, and never heavy. In the letters *M* and *N* the pen has to be turned to give the required width of line.

Bibliography: *Writing, Illuminating and Lettering* by Edward Johnston.

When the use of the pen is realised, the serious writer studies old and beautiful manuscripts and, choosing one, forms the letters and holds the pen as much like the original scribe as he can.

Notices have to be well written and they give useful practice in formal writing. Plate LXIV is a notice placed high on the page, and spaced to make a pleasant block.

¹These are based on the proportions shown in Vol. IV., page 555.

The word *Carols* takes up two line spaces. The words are written between the lines and the letters are arranged to give an evenness of line and space.

An everyday use of a skeleton form of the fine capital and small Roman letters and the use of the proportion and arrangement of pages which the scribes found to be the most useful as well as pleasant, makes lettering practical at once.

The proportions of the old manuscripts can be kept easily and with great advantage in the ordinary exercise book. If the book has a plain cover, which is preferable, the small line space can be at the top, and the larger spaces at the foot of the page. The side and inner margins are ruled in pencil from top to bottom of the pages. The side margins are larger than the top and less than the foot. The inner margins together are equal in width to an outer margin. When the book is open the three vertical margins are equal, and the two pages are combined by this means.



PLATE LXV. THE GRACEFUL APPEARANCE OF THE CAPITAL LETTERS OBTAINED BY THE USE OF A FINER PEN

Any drawings can be made directly in ink, the colour washes being kept light in tone. They can be arranged so that they keep the same margin as the writing, although no margin is actually drawn for them. The diagrams can be lettered in ink in an easy skeleton hand. The repetition of the proportions of the page and the ink line corrects the two pages and gives a greater evenness and unity.

The pages can be examined to discover if their arrangement gives a clearer explanation of the matter as a whole.

Good arrangements are not made for effect but to convey impressions more simply and therefore more clearly.

This kind of practice gradually arouses a desire for good proportion, an arrangement in printing as well as in writing.

It is interesting to count the number of different types which are used sometimes on quite small notices, interspersed with lines and other decorations. Actually, variations of this kind make the reading only more complicated and less legible, and the appearance less pleasant. The lines and other decorations are an acknowledgement of poor arrangement.

Familiarity with the original forms of our letters should lead to a demand for the use of types which are nearest to those in proportion and character, and for the greatest simplicity in their use, so that all printing may have a similar beauty and quality to that which is found in the old inscriptions and manuscripts, which comes from a careful arrangement of lines and spaces and a love of the work.

Plate LXV shows the grace and elegance which is possessed by the Roman pen-written alphabet when the size of the letters is slightly increased in relation to the size of the pen that is used. The full roundness of the curved letters assists the flowing appearance which is

characteristic of this written form, but it is this very roundness that the beginner finds most difficult to achieve. Another stumbling block is the uprightness of the vertical strokes; nothing does more to spoil the appearance of a page of lettering than a tendency for these strokes to lean either to one side or the other.

It will be found that they lean, in most cases, in the direction taken by the normal handwriting, and the first thing to insist upon is that the child shall sit squarely in front of the sheet of paper on which he or she is drawing. This helps to correct that tendency to slope the vertical strokes, as the edges of the paper come within the range of vision and act as a guide. At the same time the child should sit well back from the paper, almost at arm's length, otherwise it is impossible to judge the uprightness or otherwise of the strokes.

The edge of the hand should rest upon the sheet of paper, which should be sloped at an angle so that the child is looking squarely at the letter to be formed. If the fingers only are moved with the pen, the upright strokes are bound to be curved; the children must therefore be taught to hold the hand steady with the pen, whilst the whole forearm is steadily lowered to give the vertical stroke. If the child is sitting correctly this is a perfectly natural movement, as the arm is swinging from the shoulder. Children who have been accustomed to drawing and painting at an easel will have no difficulty in practising this method of drawing the vertical strokes, and in the same way the curved strokes are made much more easily if the whole arm is moved from the shoulder, the heel of the hand resting on the paper to steady the pen only. Hand and wrist are kept in a straight line throughout the formation of each letter.

The numerals shown in Plate LXV are not, of course, the Roman numerals, but are of Arabic origin. As the pen-written forms of the capitals have not the severity of the original "monumental" letters which were

designed to be inscribed and not to be written, these numerals harmonise quite well with them when they are written with the same pen.

Serifs.—The use of the square-ended pen for manuscript writing and lettering has produced the individual forms of both the full serif and the half-serif showing the capitals and small Roman alphabets. Children find these serifs difficult to judge as regards size, although they are easy to make. The commonest fault is the lengthening of the serif along the guide line, and the exaggeration of the points of the serif so that they curl up. The drawing of this feature as a single movement is best demonstrated on the blackboard by the use of the side of a piece of chalk, held so that its length represents the width of the lettering nib.

The pen-drawn serifs should not be confused with those of the "monumental" type shown in Class Picture No. 107. These must be accurately drawn, and the Class Picture shows a geometric form of construction for each letter which will ensure that accuracy of proportion is obtained. On the other hand, it is absolutely necessary that the child should have an unaided appreciation of the individual proportions of the capital letters before the pen-written alphabet can be reproduced successfully.

For decorative and poster work it is advisable to use the sans-serif style of letter, in which the Roman proportions are used as a basis for the form but in which the same thickness of stroke is kept throughout, the letters finishing square ended and without serifs. This style of lettering has been widely used in recent years, particularly on the posters, etc., of the London Transport Board. It is elegant in appearance and very easy to read at a distance—the first essential of all good lettering. An example of its use in school is given in Plate CIX.

The only drawback to the use of this style is the length of time that it takes, as each letter has to be drawn most carefully and "filled in" afterwards.

Plate LXVI shows the small Roman letters arranged alphabetically in the relative positions as regards spacing that they would occupy in word formations. Alternative forms for certain letters are given, and for school work the second example, in each case, of *a*, *g* and *y* may be used. The two styles should not be mixed in the same passage of lettering. The letters may join

abcdefghijkl
mnopqrstuvwxyz

The letters should be spaced evenly so that there are no gaps. Letters must not be cramped to make them fit in.

PLATE LXVI. SMALL ROMAN LETTERS MUST BE WELL ROUNDED AND EVENLY SPACED

where the natural formation makes it possible for them to do so without any distortion. The distance between each word and the next should be kept, as nearly as possible, the same throughout a passage of text.

Plate LXVII shows the effect upon the appearance and style of the lettering which is given by varying the distances between the lines. The most attractive form is that

which has the lines of lettering spaced at one and a half times the height of the small letters. This allows of a slight lengthening of the strokes of the long, vertical letter forms, and gives clearance for the down strokes of those letters which go below the line.

The patterns shown at the foot of the Plate are formed by the same pen and may be used either as borders or as "fillings" when it is impossible to complete a line of lettering without distortion. Long words which have to be "broken" at the end of a line must, of course, have the hyphen inserted at the end of a syllable. Children are liable to spoil a page of lettering by breaking a word at whatever point it happens to reach the margin.

The passage on Plate LXVIII is shown arranged in two quite different "weights" to suit the required marginal widths. In the first case the lettering is larger, and as the same pen is used for both examples it looks lighter in weight. The side margins are not much affected, but the bottom one is considerably reduced in width. In the second case, the smallness of the lettering and spacing between the lines makes it appear to have been closed up to a large extent, although this is due to the use of the same nib with which the first example was done. The compactness of the block of text adds to its weight and enables a greater marginal width to be adopted, especially at the bottom of the page. This

gives a much more satisfactory appearance, as the block is balanced much more effectively on the mount formed by the page.

This type of marginal arrangement, in which the top one is narrower than the sides and the bottom one is considerably wider, should be used throughout the second year course. In common with the bookcrafts work these margins may be named respec-

tively the "head" margin, the "spine," the "fore-edge," and the "foot." Other arrangements, depending upon variations of marginal widths and the balancing of the lettering block to suit them, will be shown in the third-year section of the course.

Applications.—The rhyme sheet makes a very attractive application of the lettering practice. A short poem is chosen, which is set out on a large sheet of paper with wide margins. Small drawings or decorations are added in a style which suits the weight of the lettering and so disposed that they act either as borderings or as head and tail pieces to the lettering blocks.

Another fascinating exercise of a similar type is the folder, an example of which is shown in Plate LXIX. A long strip of cartridge paper is cut and folded to give about five pages of a good proportion. The paper is folded so that all the illustrated pages are on the same side, like a map. The cover is designed to include the title in sans-serif capitals as shown, with either a device or a small panel as decoration carried out in water colour. The following pages consist of headpieces and panels, drawn with the lettering nib, and completed by short portions of text. The value of this exercise is great, and owing to the small amount of lettering that is required it does not take too long a time to complete. All kinds of subjects may be treated in this manner.

It is not advisable to attempt the practice of illumination as a part of the school art course. The children are unlikely to reach the high standard of lettering that is essential before anything worth while can be produced in this particular field of manuscript work, and the time required is very great. In addition, the art of illumination demands long and intensive study of tradi-

tional decoration styles, and to attempt to imitate these by the inclusion of decorated capital letters—without the knowledge of their correct design and use—is to degrade the lettering which may otherwise be of excellent quality. A good panel of plain lettering is of much greater value than a highly ornamented sheet which is incorrectly designed.

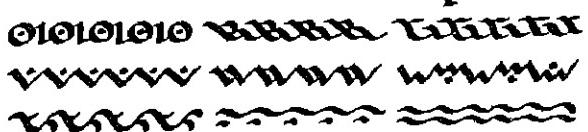
Lines of lettering may be separated by a distance equal to the height of the letters. If this distance is increased the tall letters are lengthened like this.
Try to get a flowing, easy style, with well-rounded form. Borders and decorations are done with the same pen—


PLATE LXVII. EFFECT OF VARIATIONS OF LINE SPACING

PATTERN DESIGN

During the second year the patterns are applied to the crafts, and very little fresh work is attempted in this branch of the course.

The greater portion of the time is spent, therefore, in developing the groundwork covered during the first year and in improving the style and execution of the types of pattern which have already been taught.

All the different methods of pattern production should be kept in use, and the children should be led at this stage to endeavour to plan, and to select, patterns which are most suited to the particular purpose in hand. Edge-stencils, linoleum-cut units and pen-drawn patterns will be found to be the most suitable types for the major portion of the work which is directly

The drawing and painting of natural objects may be utilised for the purpose of revising the early lessons in conventionalisation. Line drawings or water-colour drawings such as those shown in Plate LXXI may be used for devising fresh types of units such as the diaper shown in the same Plate. Formal units obtained in this way often provide interesting patterns of a kind

Nearly every type of letter with which we are familiar is derived from the Roman Capitals, and has come to us through the medium, or been modified by the influence, of the pen. And, therefore, in trying to revive good lettering we cannot do better--

Nearly every type of letter with which we are familiar is derived from the Roman Capitals and has come to us through the medium, or been modified by the influence, of the pen. And, therefore, in trying to revive good lettering we cannot do better--

PLATE LXVIII. EFFECT OF VARIATION OF WEIGHT OF LETTERING AND OF MARGIN WIDTH

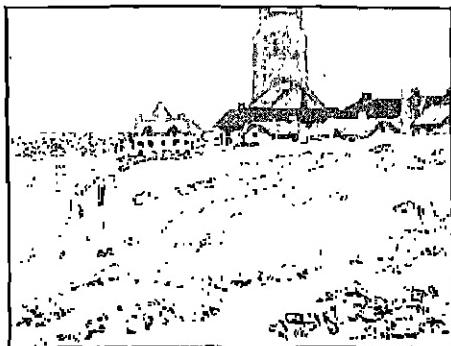
applied to the bookcrafts as shown in Plate LXX.

In its application to weaving, the pattern form is regulated by the material and the processes involved, and to a large extent it will follow traditional styles. On the average school looms the "honeysuckle" variations and the plaid will form the greater portion of the designs in common use.

that is suitable for block printing on fabrics, being used for curtains and similar hangings.

Plate LXXII shows another variant of the unit repeat which may be practised during this part of the course. The border pattern has many uses in poster work and bookcrafts, and the opportunity may be taken to impress upon the children the fact that every successful border design depends

CROMER



THE NORFOLK POPPYLAND

1



Pretty Cromer is one
third of a mile from
the Sheringham road.
Wild stretches of heath
surround us; beyond lie the woods,
and old Sheringham.

2



The village of Erpingham is about two miles from Blickling. There is a brass in the church to the memory of Sir John Erpingham, the father of the doughty knight of ancient chronicles -----

3



The charm of Wells
lies in its ancient
houses and its wide
creek; the peace of
its stretches of sand.

4

PLATE LXIX. A FOUR-PAGE FOLDER OF DESCRIPTIVE LETTERING

The cover title is drawn in sans-serif capital letters, with a water-colour panel. The decorations on the other pages are done with the same pen as that used for the lettering.



DESIGNS FOR BOOK COVERS
(Class Picture No. 139 in the Portfolio.)

upon continuity of "feeling" if not of actual line. That is why the border pattern should have as its basis either the zigzag line or the continuous, flowing curve.

In the first example (Plate LXXII, top left) the triangle unit is obviously derived from the zigzag line, and this pattern may be described as being of the "geometric" type.

The second example retains the flowing

"wave" line upon which it is constructed. Each unit contains a half-curve, so that every alternate unit is reversed to obtain the necessary continuity. This type of pattern may be described as the "natural-form" border:

The third example is based upon two interlacing and eccentric "wave" lines. The conventionalised animal form which it suggests arose from the shapes enclosed by

the original lines and was not the starting point of the design. The treatment, however, may be described as that of "conventionalised animal form," and is suitable for children's work in the production of nursery friezes and similar decorations.

The last example, based upon a contracted "wave" line, may be classified as being of "abstract form." It suggests nothing, and is simply a disposition of curved forms about the starting line, in accordance with the rough-and-ready rule that the total *area* of unit forms should about equal the total *area* of background space. This rule applies to all patterns which are designed to cover a given area, whether they are unit repeats or not.

HAND BLOCK-PRINTED FABRICS

One of the most interesting and useful applications of pattern design is the printing on fabrics of unit repeats to form all-over patterns for curtainings, dress materials and similar purposes. Fine canvas, linen, cotton fabrics and silk may be treated in this manner with very little equipment, and at a low cost. The use of fast dyes and specially prepared colours has done away with the unpleasant oil-paint stencil and enables the design to be transferred to the material in such a way that the colour is absorbed into the texture of the material itself without in any way damaging its surface quality.

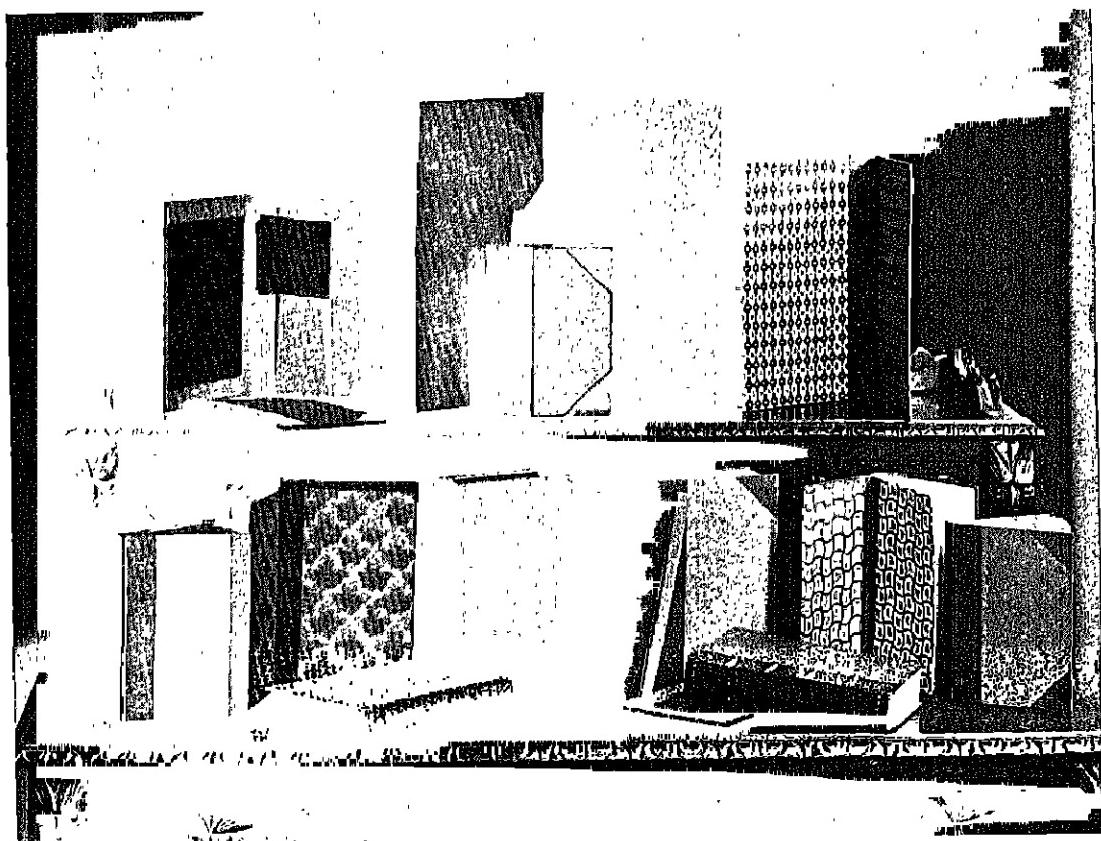


PLATE LXX. APPLICATION OF PATTERN DESIGNING BY VARIOUS METHODS TO MORE ADVANCED BOOK-CRAFTS EXERCISES

The process closely resembles that of linoleum-block printing, and in essentials the same method is followed as for an end-paper. Linoleum-block units are cut in thick, plain linoleum, and are mounted upon wood blocks about 1 in. in thickness. Red deal (yellow deal) or American whitewood will serve for the purpose, the linoleum being

In most cases the time that can be allotted to this branch of the work as a part of the general art course is regrettably short, and for that reason it is recommended that the ready-prepared fabric-printing dyes, which are supplied by artists' colourmen, should be used. These will obviate the need for much of the equipment for which other-

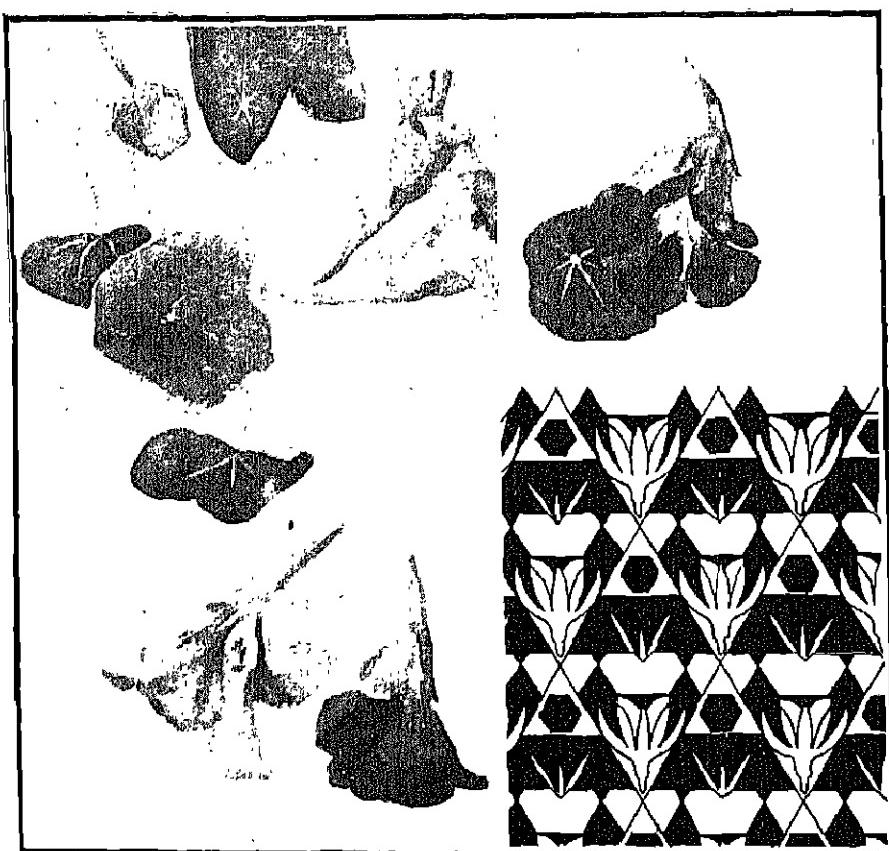


PLATE LXXI. DRAWINGS OF NATURAL FORMS USED FOR THE PRODUCTION OF PATTERN UNITS

glued firmly to the block and left to dry under a weight or in a vice.

Fast dyes are used for printing, mixed with a gum such as tragacanth to prevent the dye from "spreading" beyond the outlines of the pattern unit, and to dilute the intensity of the colour when this is desired.

wise storage space has to be found, and a great deal of time will be saved thereby. For those who wish to enter more closely into the craft processes and who have the time and space to devote to a thorough study of them, there are several excellent text-books on the subject.

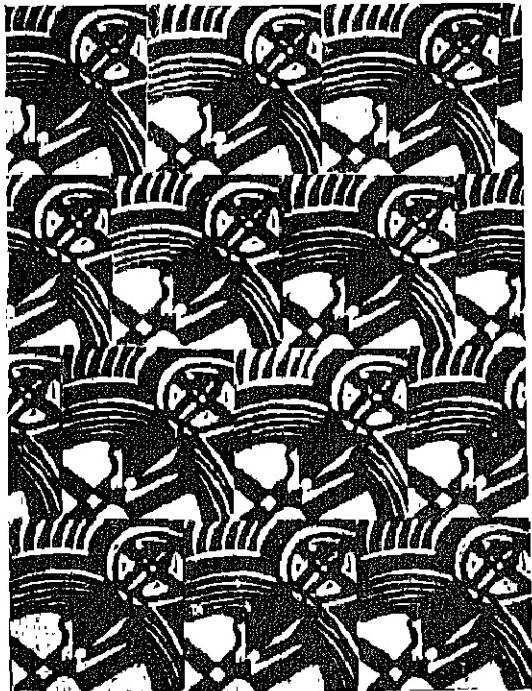
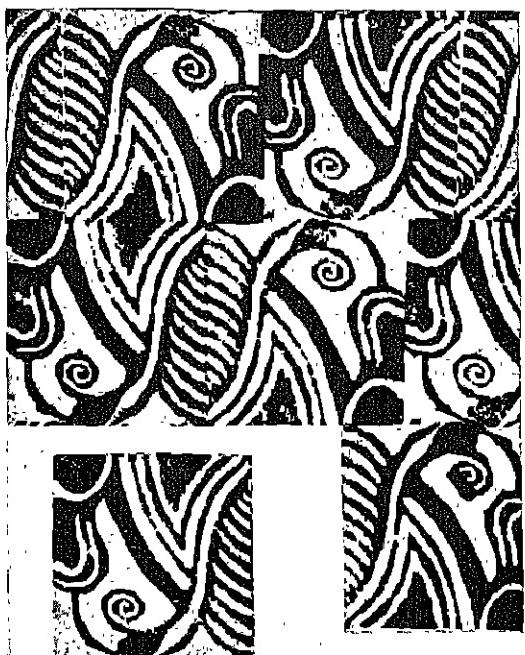
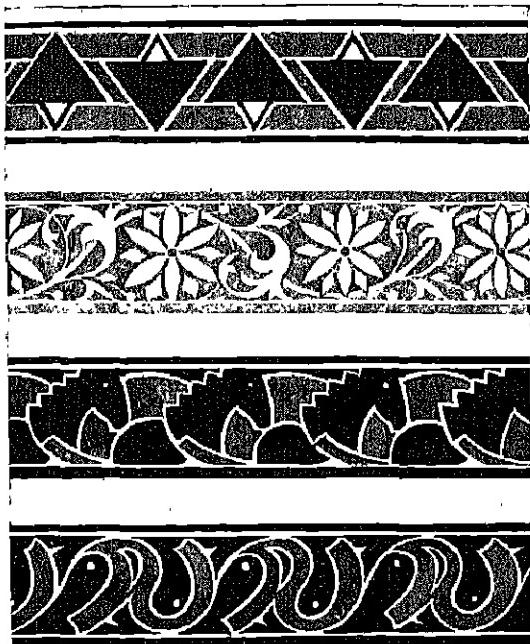


PLATE LXXII

Top left: Border designs based upon zigzag lines and wave lines.
Top right: An abstract unit based upon an S-line.
Below: Linoleum-cut units printed upon fabric as all-over patterns.

Other equipment.—In addition to the mounted blocks and the prepared fabric-printing colour the following will be needed:

A strong and steady table, having a top that will not "bounce" under a blow.

A large blanket, or a similar area of carpet underfelting.

A fairly heavy hammer, or mallet.

Flocking mordant, and flocking powder (these are necessary if it is desired to obtain very evenly dyed pattern areas, especially on rather thick or coarse materials).

A large piece of glazed "American cloth" (Woolworth's).

Designing the block.—An abstract unit based upon a curved S-line, such as the one shown in Plate LXXII, will give the most interesting patterns. The unit is first drawn out on paper, the printing surfaces being blacked in. Then a tracing of the unit is made on ordinary tracing paper. The tracing is transferred to another sheet of paper, to represent one unit repeat, whilst the tracing is reversed to check the "linking up" of the next unit in line if it is desired that the main lines should flow throughout the pattern, as shown in Plate LXXII.

When the unit has been checked in this way and found to be correct, the surface of the mounted linoleum block is either chalked over or covered with a film of Chinese white. The tracing is then reversed, and is pinned over the block whilst the lines of the unit are gone over with a pencil.

Next, the block is cut in the same way as for a pictorial print, as described in the chapter on linoleum-block cutting and printing.

Setting-out.—The material it is desired to print should be stretched over the padded table top. If pins only are used, it will often be found that the material is unevenly stretched, and this may be avoided by turning one edge of the stuff round a long strip of stiff card or strawboard. This may then be pinned to the edge of the table with upholstery brads.

The blanket or underfelting is already pinned to the edges of the table top to provide a slightly springy surface which will ensure that all parts of the printing surfaces of the block will make contact with the material. This padding should be protected from staining by being covered with the American cloth.

Small pieces of material should be ironed flat and pasted round the edges to a sheet of paper before printing on the table, but large pieces or lengths of material are stretched across as described above, using a second straightedge at the front which may be pinned at the ends only.

The positions of the unit repeats may now be set out with straightedge and large set-square, using faint pencil lines for the purpose.

Printing.—The method of printing depends upon the ink or dye which is used. For trial prints on paper to test the success or otherwise of the pattern, ordinary water colour or poster colour may be used, applied as for an ordinary linoleum block print.

For printing on materials the best results will be obtained if the block is charged from a pad which itself is charged beforehand. This is done with a wide soft brush such as a varnish brush. Prepared dyes such as the "Fairy" or "Drummer" varieties may be used directly. The specially prepared colours supplied by the artists' colourmen may need thinning by the addition of turpentine, but the advantage of these is that they are quite fast, and will not need steaming out. If it is desired, many other dyes may be prepared for which it is not possible to give all the recipes here, but they are obtained in powder form which requires the use of a solvent acid; also a binding and thickening agent such as gum tragacanth, and a mordant such as tannic acid which fixes the dye upon steaming out.

The printing pad is prepared by covering a piece of wood with several layers of underfelting which is, in turn, encased tightly

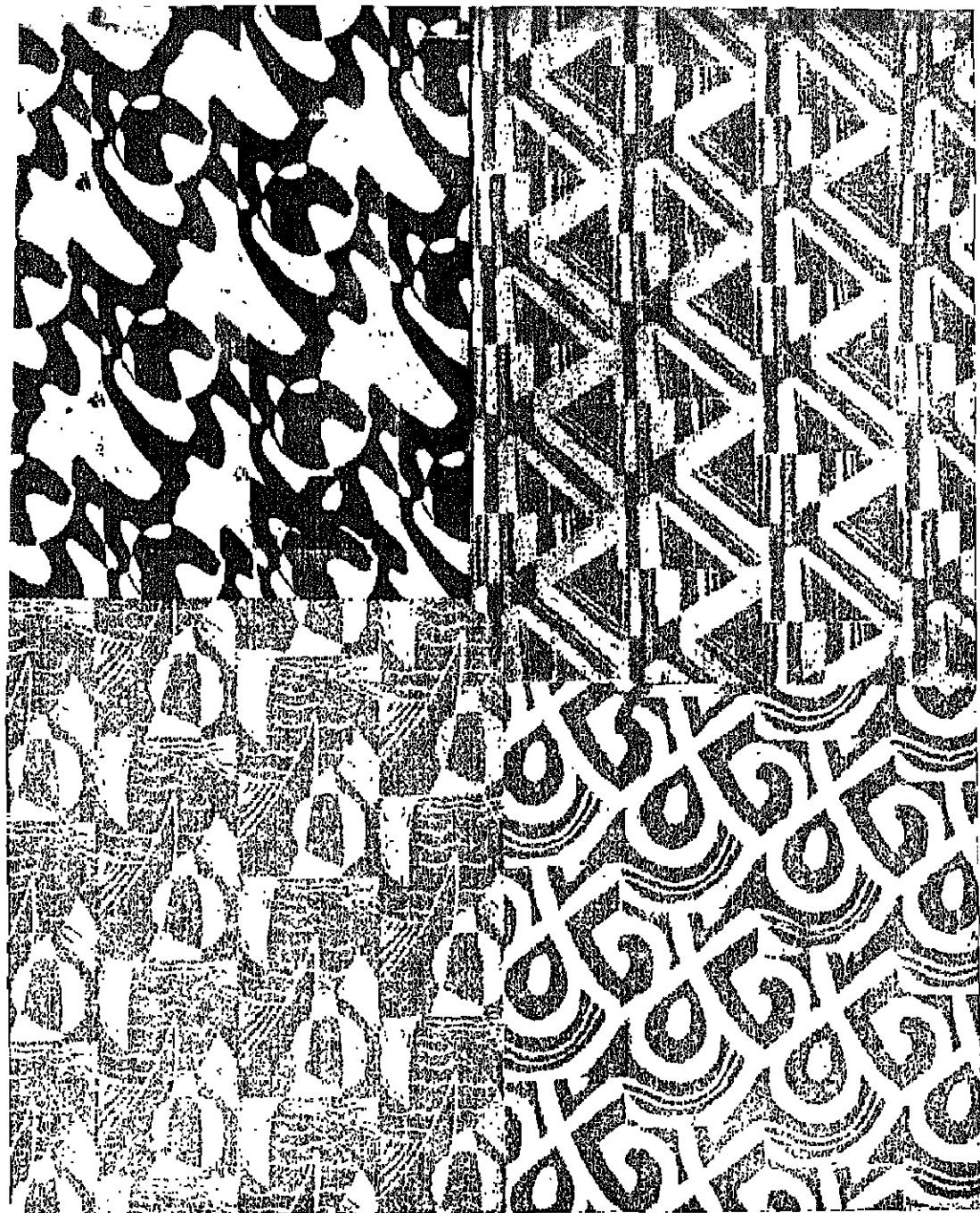


PLATE LXXIII. LINOLEUM-CUT UNIT REPEATS IN ONE COLOUR, PRINTED UPON FABRIC GROUNDS

in American cloth, pulled round over the edges of the wood and pinned beneath. The padding is to ensure that every part of the block shall make contact with the charged pad which lies on top of this printing pad. The size of the piece of wood varies according to the size of block used, but a pad of about 8 in. square, by 1 in. thick (without the underfelting) will serve for most blocks.

The American cloth, or some similar covering, is necessary so that it may be washed off before using a differently coloured dye.

A strip of calico or flannel is cut about the same size as the printing pad, and is charged with dye applied with the wide brush. The block is pressed firmly, but not too heavily (otherwise the background will be smudged), on to the pad. When the surface is seen to be evenly inked, the block is placed carefully in position on the guidelines of the stretched fabric and is given a sharp blow with the hammer or mallet. The padded table top under the fabric ensures that, upon this blow being given to the back of the block, every part of the printing surface is pressed firmly on to the fabric.

The charging strip must be re-charged for each separate print, unless the block is very small.

Preparing the surface of the block.—For smooth-surfaced fabrics and very closely woven materials it will hardly be necessary to give any special preparation to the surface of the block, especially if the pattern is such that a slightly mottled surface will not matter.

For a clear and definite print on a coarser material, however, the block should first of all be flocked. To do this, a stiff cloth "dabber" should be made round a small piece of wood by winding the cloth tightly round it several times and tying the ends together. This dabber is used for applying the prepared flocking mordant, which is a quick-drying gummy preparation, to the

surface of the block. The mordant is spread thinly on a sheet of glass and is then dabbed lightly all over the printing surfaces, taking care to see that it does not get on to the background of the block, and that the block is dry.

The flocking powder is then sprinkled over the block until the latter is evenly covered. It is laid aside to set and dry, after which the surplus powder is lightly brushed off and the edges of the printing surfaces are trimmed clean. The block will now have a surface resembling felt which will ensure an even print on the fabric. In use, it should at first be tried out on paper as it takes some little time for the flocking to pick up the colour properly, which it does when it becomes damp and evenly saturated.

Plates LXXII and LXXIII show small unit repeats which have been printed upon different fabrics and upon paper. It is as well at the beginning of this work, and in the second year, to allow the children to experiment with small blocks, leaving the more ambitious efforts on finer materials until the third year of the course. The prints illustrated are upon paper, calico and fine canvas of the type suitable for book coverings.

FIGURE SKETCHING AND COMPOSITION

More time should be given to this branch of the work during the second year in preparation for the later illustration purposes of the third year course. As indicated in the first year notes, the children will benefit more from encouragement in free sketching than from a series of exercises based upon the use of "matchstick" men, etc. This latter method does not really help them to any great extent and may, in fact, cause their drawings to retain that early stiffness which is shown when they are "built up" rather than freely drawn from direct observation.



PLATE LXXIV. SKETCHES FROM LIFE, IN VARIOUS MEDIA



PLATE LXXV. CARTOON FOR A PANEL, BASED UPON RAPID SKETCHES MADE FROM LIFE

Fifteen-minute sketches from an actual model are of the utmost value however crude some of the attempts may appear to be at first. Different media should be used for the same subject although the pose should be changed frequently, and the drawings should be carried out in charcoal, pencil, pastel and Indian ink. In the last case a brush should be used and direct drawing with its flexible point should be insisted upon as no other medium will give the same confidence after practice.

These lessons should be supplemented by a free use of the sketchbooks for out-of-school subjects which should include various animal forms. These sketches are also of great value as they must be made quickly so that the momentary pose of the animal is caught as far as possible in a few lines.

The notes assembled in this way are used for composition exercises in which the

simple laws of design and pictorial arrangement already dealt with are applied to the particular example in hand. Colour notes may be added for future reference, should the designs be needed again for wall panels or other purposes.

Plate LXXIV shows examples of sketches of this type, and plate LXXV illustrates a figure composition in line and wash which has been assembled from a number of such sketches. This example is in the form of a cartoon carried out on cartridge paper in preparation for a tempera colour panel, and a panel of this type is shown in Plate CI. Tempera panels make excellent school and classroom decorations, and they are best painted on the specially prepared surface of Upson or Beaver board, which is obtainable in large sheets in a thickness of about $\frac{1}{8}$ in. The surface of Upson board is slightly grained, so that it gives an excellent "bite"

for either tempera colour or oil colour. For school use it is better than either wood or canvas, as there is no question of shrinkage and no need for stretching upon frames or for priming of the surface.

It should be noted that the great value of this type of work is the use of a correct technique which brings it within the powers of the children. Treatment is in the flat throughout and there should be no "shading" or useless detail in the drawings, which are decorative in style and in appearance—a fact which makes them eminently suitable as wall decorations.

Where it is not possible for any special reason to use either oil paint or tempera, some very good effects can be obtained with ordinary distemper colours which are much cheaper.

OBJECT DRAWING, NATURE DRAWING AND PERSPECTIVE

To give a balanced course, these branches should be followed during the second year along the lines already indicated in an earlier chapter. As the second year stages will merely amplify the practice outlined for the first year course, no further illustrations are given here but details of the more advanced stages are given in connection with the third year course on a later page.

MONTHLY SUMMARY OF SECOND YEAR'S COURSE

September.—1. Pencil and colour sketches made during the holiday period should be utilised for fresh composition exercises of a simple nature, giving instruction in the use of the pencil for "blocking-in" and for getting approximate tone values for the pattern of the illustration. Simple treatments in line-and-wash.

2. The material of Lesson 1 to be amplified by more sketches, as details are required. Notes taken of methods of pencil technique

for particular purposes, such as the linework for shading, and the representation of a softened edge by the stopping of cross-lines without an actual outline. (See *The Technique of Pencil Drawing*, by Jas. Salwey; Batsford.)

3. In direct connection with above lessons; rapid figure sketching from actual models chosen from the class. Ten-minute sketches for variety and economy of line; endeavouring to get the "pose" of the figure as simply as possible. No shading.

October.—1. Colour lessons continued, in notebook at first. Introduction to the complementary scheme (see Class Picture No. 133). Proportionate arrangements in coloured papers.

2. Applications of these fresh rules to patterns needed for the crafts.

3. Application to simple illustration subjects, still "in the flat" and in paper. The September lesson subjects are used, being treated in this different manner.

November.—1. Lettering practice. Capitals in single line, to obtain correct proportion and to give preliminary practice in the free drawing of the forms. Pencilled between guide lines.

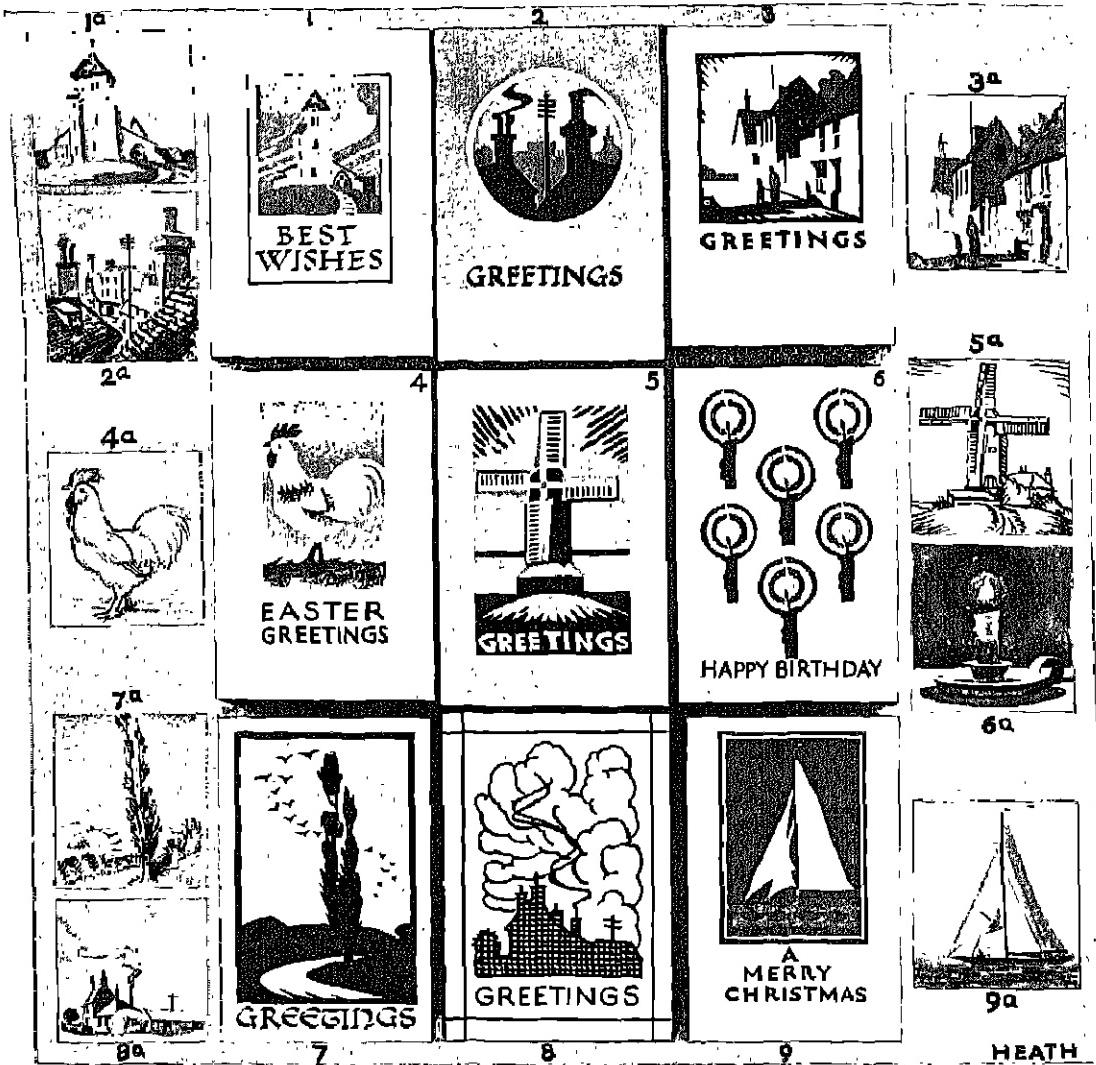
2. Small alphabet, on lower half of same sheet, to get roundness and flow of the forms.

3. First practice with lettering pens, on scrap paper. Blackboard demonstrations with side of chalk.

December.—1. Application of term's work to greeting cards. An advance on the first year stage of this work as simple panel decorations in the flat may be used, with the addition of a little lettering. See simpler examples on Class Picture No. 138.

2. Completion of Lesson 1.

3. Test of pencil work. Definite set-subject memory drawing; either from class observation immediately beforehand, or from set subject studied for some days previously out of school. Economy and variety of



DESIGNING GREETING CARDS FROM SKETCHES

(Class Picture No. 138 in the Portfolio.)

strength of line to be the aim, with the drawing to be as free as possible.

January.—1. Discussion of drawings done during Lesson 3, December. Criticisms offered by the teacher should be illustrated very briefly on the blackboard and should be noted by the children in their notebooks. A revised arrangement is begun on the blackboard, in conjunction with suggestions by the

children who are using their earlier drawings and notes for reference.

2. The new arrangement is finished. The children make their own drawings of the same arrangement, on a fresh sheet of paper. Each child is allotted a different starting point for the colour scheme, working in rotation round the class. Colour schemes are worked out, the children using the new complementary scheme as a basis.

3. The colour schemes having been checked, the children build up the final illustration in coloured papers. Revision questions are asked and comparison is made with the earlier pencil drawing.

February.—1. Object drawing may be combined with the first stages of the simple technique of water-colour painting where facilities exist for this type of work. It is practically impossible to teach it in the ordinary classroom as the children cannot see the objects properly. If sufficient space is not available and movable easel-desks or tables are not provided, it is better to substitute another type of lesson.

Two or three objects of plain form and contrasting tone values are arranged before a light background. It may be necessary to divide the class into two groups, one of which is working on some more mechanical branch of the course. The objects are drawn with care. The children look at them with half-closed eyes to determine the high lights, the half-tones and the darks. These are indicated by lightly outlining the edges of the dark areas, irrespective of the particular object to which they belong.

2. A flat wash of medium strength sepia or ivory black water colour is mixed ready in a large palette. The teacher demonstrates the method of laying a flat wash, and the children practise this first on scrap paper. Then the graded wash is shown to the children and is practised by them.

3. The prepared drawing is made ready on a slope, and the medium-strength wash is again mixed ready. A combination of flat and graded washes is used to represent the half tones, leaving the high lights untouched white paper. The whole of these half-tone areas is covered in the one general wash, irrespective of the outlines of individual objects.

A strong wash is now mixed, and this is superimposed on the first wash wherever the deep tones occur. This is more difficult as the graded portions must be laid swiftly and lightly, each stroke covering a fresh

part. No part of the wash may be gone over twice, otherwise the first wash will be lifted and will be spoiled.

With a little full-strength colour the darkest and smallest accents may be put in with a full brush, as blobs, and left to dry.

The group of objects has now been represented by two main washes, the lights being left and the accents added last of all. The method trains the children to paint a picture as a whole and not in small pieces. It teaches them to look for the main forms, lights and darks, and to ignore unimportant detail. It compels them to study tone values, irrespective of individual hues, and it prepares them for the more advanced work of this type which they may attempt during the third year, and which is shown in colour in Class Picture No. 136.

March.—1. A similar appreciation of the value of contrast of tone in simplified form is gained by the designing of linoleum-block prints. This material is being used throughout the course for the production of pattern units, and during the second year it may be introduced for illustration and decorative purposes, at this stage immediately following upon the last exercise.

Designs should be sketched out on paper as indicated in the previous pages. Solid black on white only, at this stage.

2. Printing of the designs. Mounting in various ways and for different purposes.

3. Application of (1) and (2) to further practice in lettering and manuscript writing. A written rhyme sheet, decorated by small and simple linoleum cuts, or a folder of the type illustrated in Plate LXIX.

April.—1. Completion of Lesson 3 above.

2. Rapid figure sketching from the model chosen from the class. Use of pencil, pastel or charcoal, and brush. Model changed every fifteen minutes. (*Note.*—The results will be very crude at first, but many of the children will make rapid progress and will thereby encourage the others to do better.)

3. The notes and sketches on the elements

of perspective are carried a stage further in preparation for the illustration work of the third year. Include a few notes on colours—the use of greys, and the diminishing of tone values in aerial perspective.

May.—1. If desired, the pure water-colour method may be taken a stage further by painting suitable natural objects such as flowers and foliage. In a school possessing a garden, this work may be incorporated much more usefully in the production of a folder, notebook or chart, tracing the development of a particular plant or group of plants. Notes are added, and the whole exercise may be bound in an attractive manner. Other drawings may, of course, be done in pencil, brush or pen for the same purpose.

2. Completion of Lesson 1.

3. Outdoor sketching of natural features, where the situation of the school makes this possible, for future illustration work. Trees, the main lines of a landscape, the line of a range of hills (this is always exaggerated in children's drawings into "saw-teeth" shapes), a bridge, a church, cottages, a farm, a cart, etc. In a town school, there is something worth drawing from one point of view in practically every playground.

June.—1. Continuation of either the nature notebook or the outdoor sketching. Both these branches are of the greatest value.

2. The sketches obtained in this way are used in addition to the ordinary sketchbooks, and the earlier sketches, to provide material for the first attempt at an arranged figure composition which is to be treated as for a decorative panel. This work actually is done during the third year, but some previous practice in the form of smaller scale drawings or "cartoons" is necessary.

Individual subjects are chosen; the proportion and size of the panel is decided upon, and it is drawn to a smaller scale. The subject is roughed out in pencil and wash, flat-colour areas being used. The children will tend to make their figures too small and

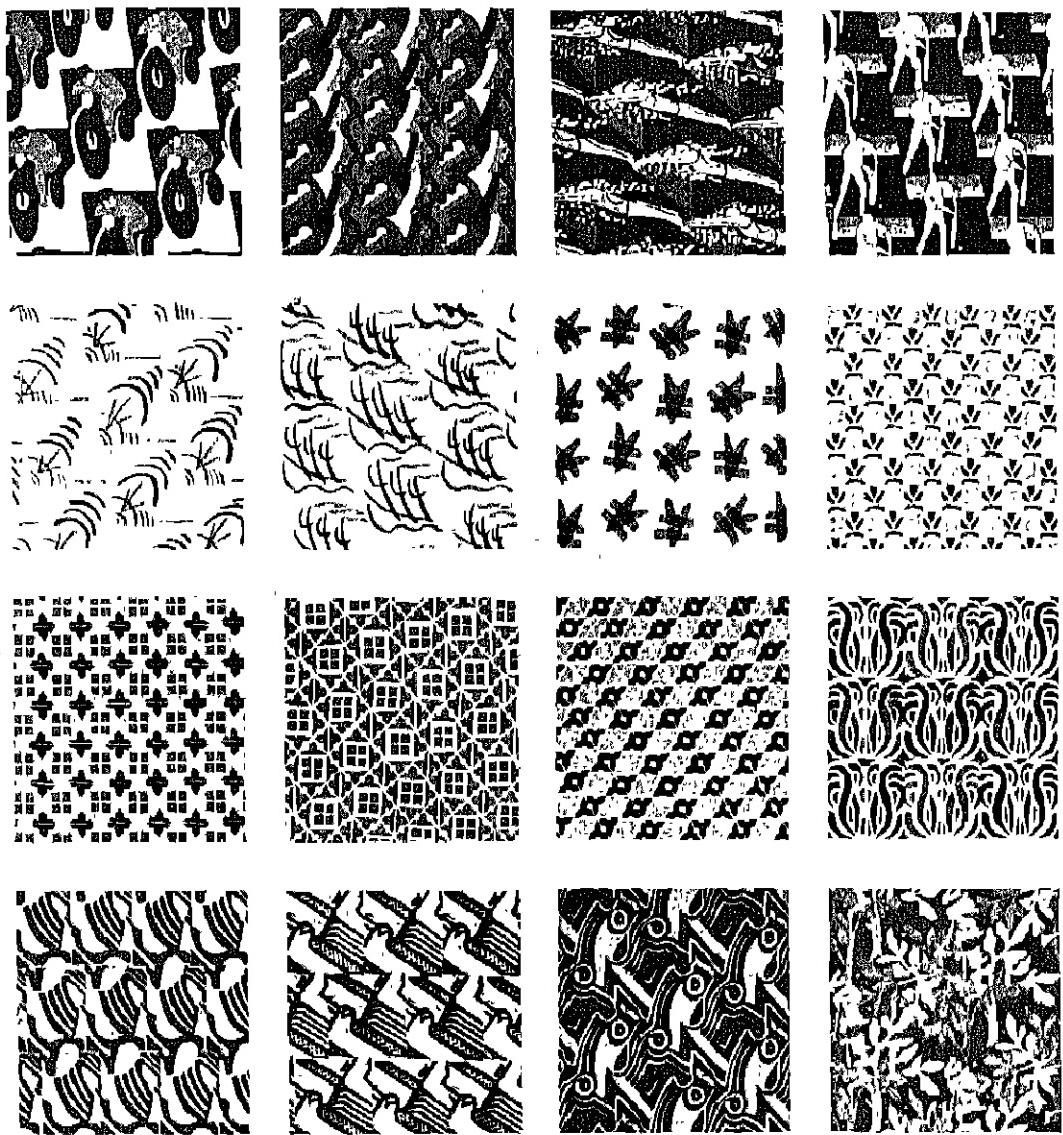
to arrange them in a line across the panel at about the same height. A specimen panel or a good reproduction should be used to give them some idea of grouping the figures.

3. Continuation of Lesson 2. The majority of the finished designs in colour should be kept for future revision, but one or two of the best may be carried out at full size by the children who show an aptitude for this type of work. Ordinary distemper colour may be used, mixed with size, on Beaver board; or poster colour may be used on a sheet of strawboard of the kind supplied for bookbinding cover boards. Decorator's oil paint is quite good, and may be used on a thick strawboard which has been sized with ordinary Scotch glue, used thinly and brushed rapidly all over the surface. This gives quite a good "bite" for the painting. Space and convenience is needed for painting such panels, as it tends to become a messy business under unsuitable conditions. Two children may work on one panel.

July.—1, 2 and 3. At the end of this term it will be found that many of the children have been unable to keep pace with the rate of progress during the second and most difficult year. For this reason most classes have resolved themselves by this time into two or more groups. No definite lessons are suggested, therefore, for this month as the time will be needed for revision and for clearing up of difficulties, and the scope of the second year's course has already been covered.

Some definite work along the lines already indicated should be set for the holiday period—work which can be included in the sketchbook and which will not entail the carting about of apparatus.

The sections in these volumes which are entitled *Sketching out of Doors* and *Classroom Drawing Practice* are an invaluable guide to the type of work which should be attempted by the children in their sketchbooks, both in term time and in holiday periods, and which is needed constantly for illustration and composition purposes.



ALL-OVER PATTERNS
(Class Picture No. 137 in the Portfolio.)

THIRD YEAR

ILLUSTRATION

FOllowing upon the second year exercises in pictorial arrangement and colour application, the third year illustration work should have a definite application as its aim. Several forms of illustration will be practised, including purely pictorial subjects for mounting and framing; book illustrations; linoleum-block prints; posters, and decorative panels for wall coverings. Every one of these forms requires individual treatment and therefore each will be dealt with separately.

Pictorial subjects.—In these the aim should be to select and to arrange a good composition. An interesting subject should be chosen, but interest alone is not sufficient to make a successful picture. If a tree or a telegraph pole interferes with the main lines of the arrangement it should be left out, or it might improve the picture if it appeared at another point instead. Buildings and figures may need to be enlarged or to be made smaller.

If the sketch is to be carried out in water colour it should be painted in the manner indicated in Class Picture No. 140, which shows how the picture is washed in as a whole and not as a number of separate details. For pictorial work the colour should be restrained, with the exception of small details which are intended to "stand out" from the general background areas. The red coat of a huntsman "glowing" against a background of distant foliage and fields would be an example of this use of intense colour, and this method of setting off bright hues against greyed colour has already been referred to in connection with the use of coloured papers.

Preliminary pencil sketches play a very important part in this work, and Plate

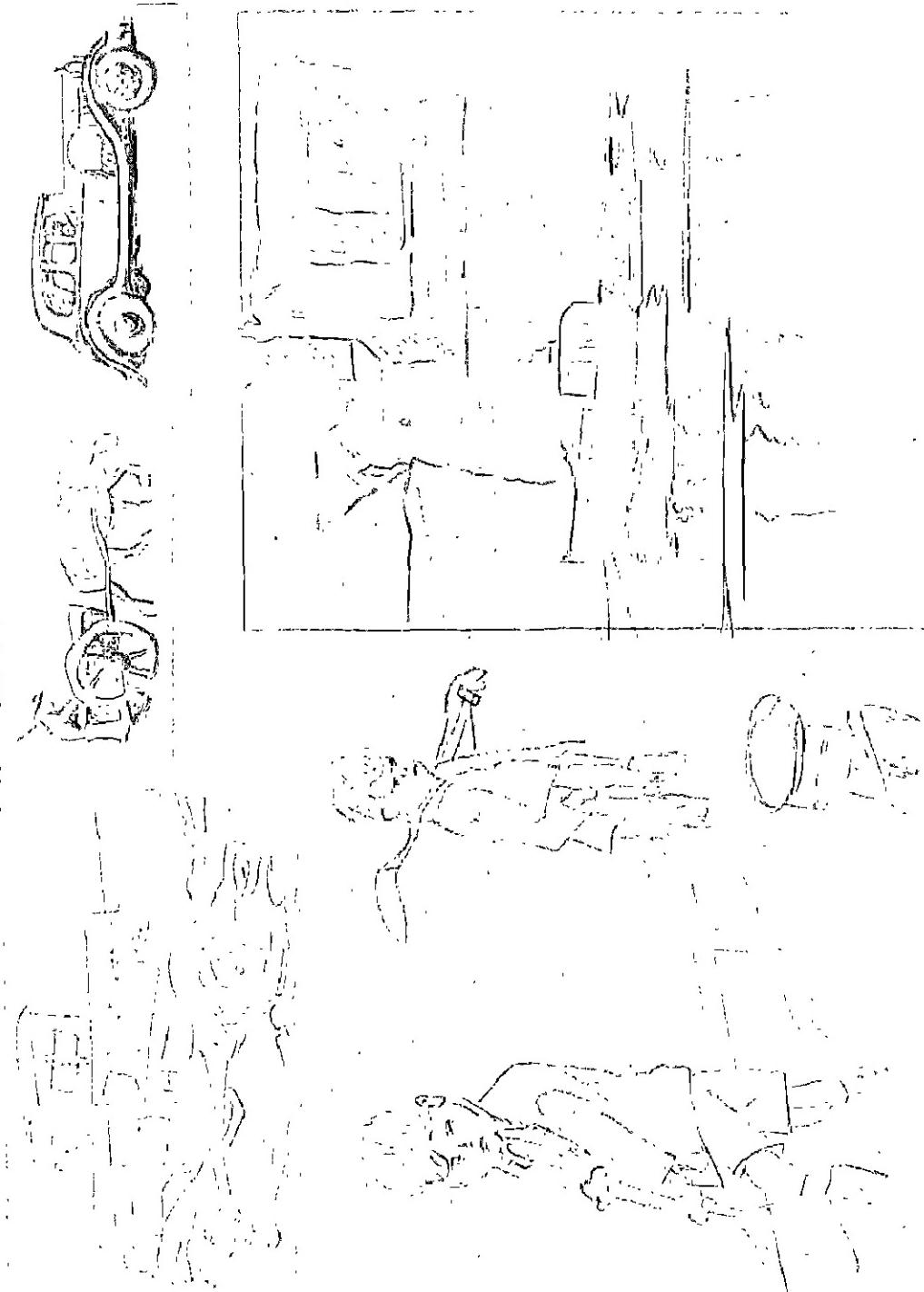
LXXVI shows sketchbook drawings which could be incorporated in different compositions. Many other suggestions are given in the article on *Sketching out of Doors*, Volume III.

Plate LXXVIIA shows two illustrations which are carried out in a bold style with clean, free washes, and a lack of unnecessary detail. The one which is entitled *Haymaking* shows a good sense of pictorial values on the part of the thirteen-year-old child who painted it. Though well arranged, the other illustration does not show the same understanding of contrast in the tone values, and the background detail which is seen between the two buildings does not take its proper place in the distance.

Contrasting tone values are well brought out in the paintings shown in Plate LXXVIIB. In the case of the landscape with trees the distance is well represented and the perspective is good. The arrangement of the tree trunks has been carefully studied to obtain variety with opposition to the horizontal lines of the scene. In the other illustration the effect would have been improved by more variation of tone values in the foreground, between the bottom edge of the picture and the bridge.

Plates LXXVIII, A and B, show more advanced illustrations which combine good drawing with a much greater command of colour. In both cases the warmth of sunlight pervades the whole of the painting, whilst the greyed hues of the foliage are used with skill as a foil to the brighter colours. In both paintings yellow ochre has been used as the basis for the preliminary washes. This, with the addition of a tinge of pink, gives the sunny effect to the finished painting as it affects each subsequent wash of colour. In this way the yellow harmonises the whole scheme, or "pulls it together."

PLATE LXXXVI. Sketchbook Pencil Notes for Future Use in Other Illustrations



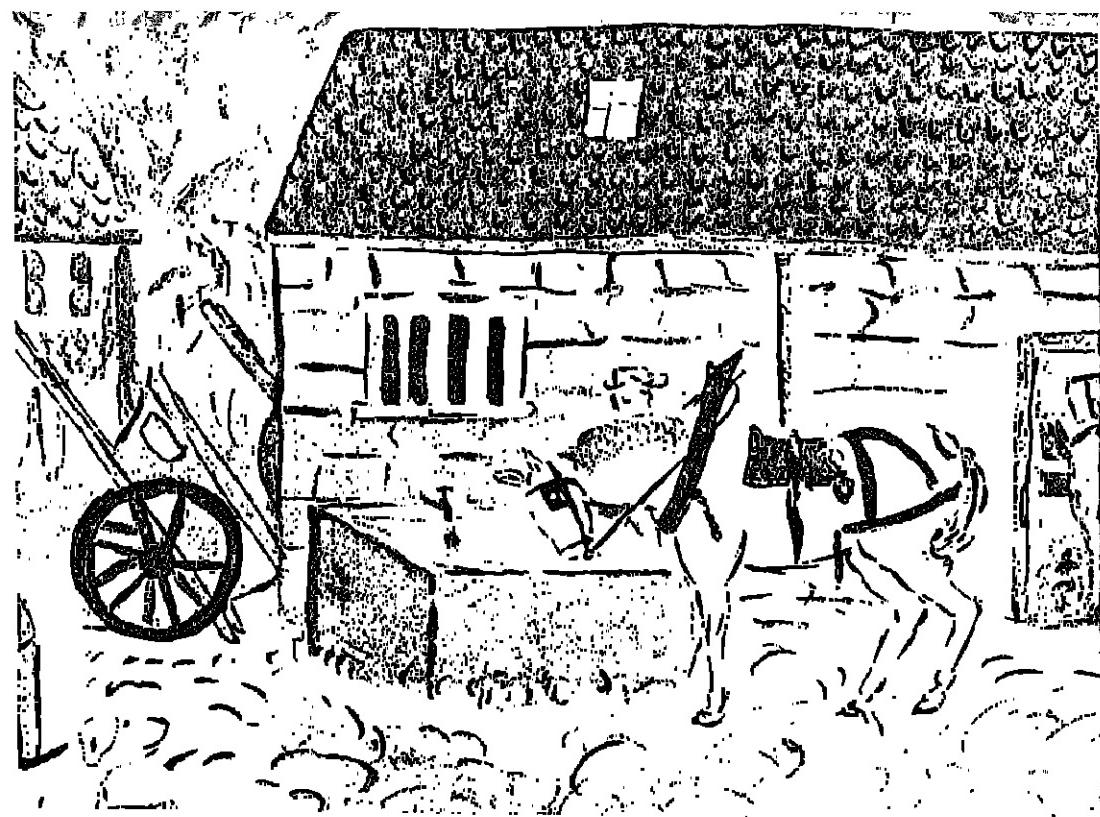
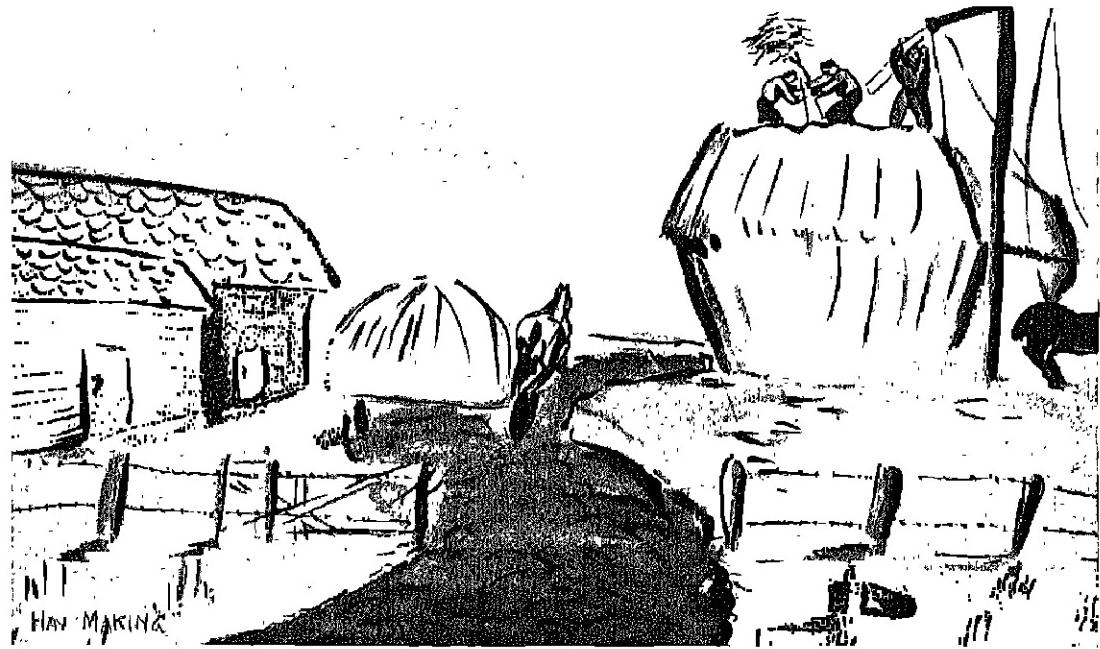


PLATE IVYVITA - WOMAN SPINNING FIBRE

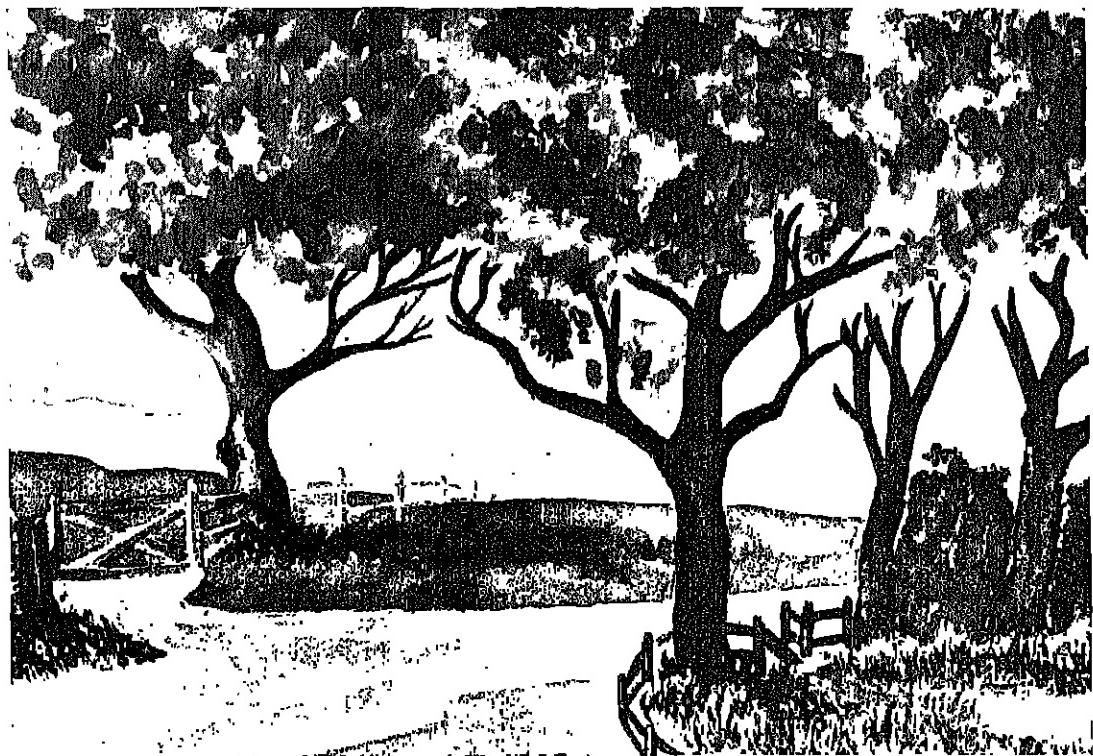


PLATE LXXVIIIB. WATER-COLOUR ILLUSTRATIONS



PLATE LXXVIIIA. MORE ADVANCED WATER-COLOUR ILLUSTRATION

The illustrations in Plate LXXIX show the same subject as seen from a slightly different viewpoint. They are drawn in black line, with small areas of solid black, after which the parts of the picture are tinted with light washes of water colour. This is a method suitable for book illustrations, providing that the weight of the lettering on the opposite pages is gauged to balance that of the illustrations. As a general rule it may be stated that the woodcut or the linoleum cut is more suitable than a drawing for the purpose of book illustration.

Linoleum block prints.—In this medium the illustration work of senior children may reach its highest standard. Drawing and

composition may combine with simplicity of treatment and a tonal pattern to produce a fine piece of work, without the technical difficulties that would occur during the representation of the same subject in water colour.

The medium may be used purely for pictorial purposes as shown in Plate LXXX and in Class Picture No. 131, or it may be used for printing designs and illustrations for rhyme sheets, calendars and manuscript books. Other applications have been referred to in previous sections of the course.

If the preliminary stages have been covered during the first and second year courses the greater portion of the work during the third year will involve the use

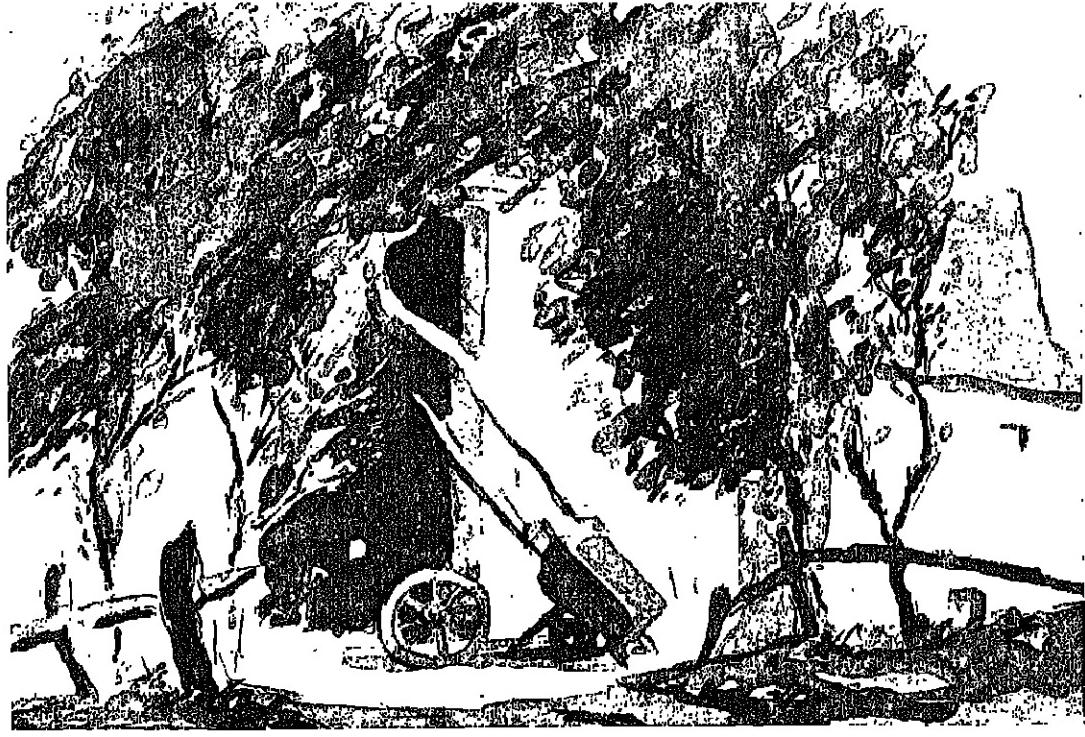


PLATE LXXVIIIB. MORE ADVANCED WATER-COLOUR ILLUSTRATION

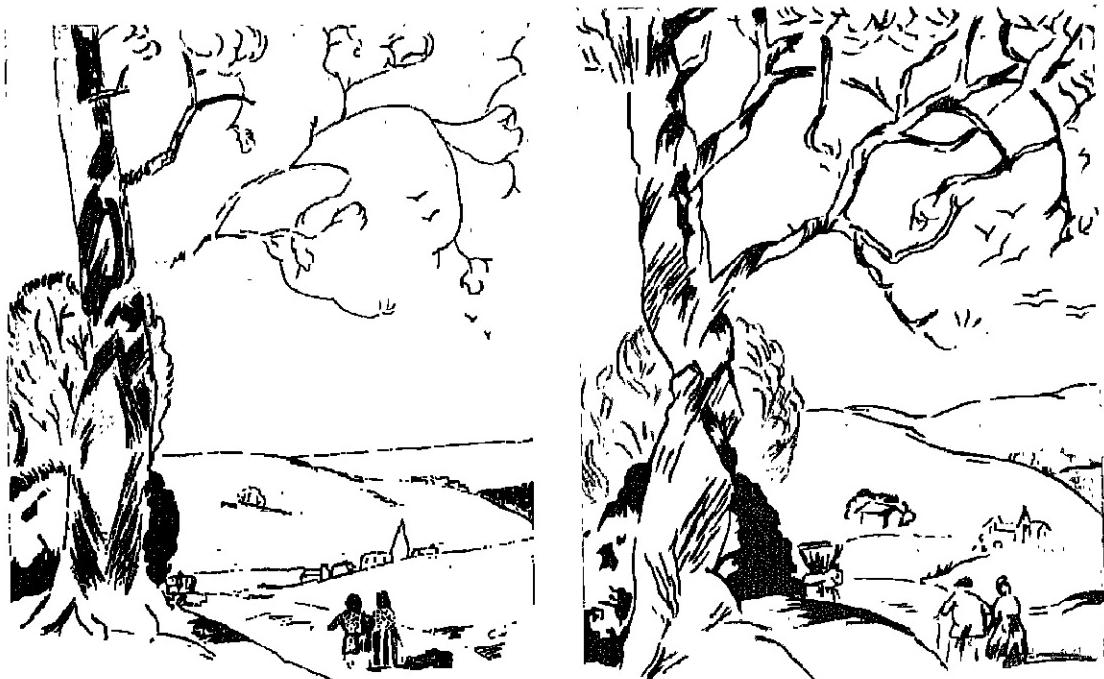


PLATE LXXIX. ILLUSTRATIONS IN LINE AND WASH

of more than one block. Prints from multiple blocks may be made in black and tones of grey, as in Plate LXXX, or in various colours as in most of the other Plates and in Class Picture No. 131. Where several colours are used, the near-greys are obtained by overprinting portions of the separate colour blocks. This is shown in the Class Picture.

To print from more than one block it is necessary to register every block that is used from the original tracing. This is a comparatively simple matter if the register marks are cut in the marginal waste of each

The chief difficulty to be experienced at first is the selection from the original drawing of the particular portions that are required for any one block. It has to be remembered that in addition to all the parts of the drawing that are to be printed in the one plain colour it is necessary to add those portions which are to be overprinted by one or more different colours. Children can master this difficulty more easily if they build up the original drawing by a series of flat washes of colour corresponding to the colours of the various blocks. Some parts of the drawing will be left from one flat wash alone,

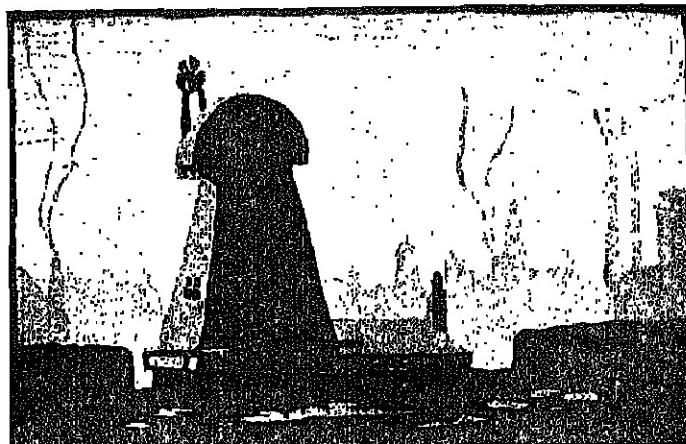


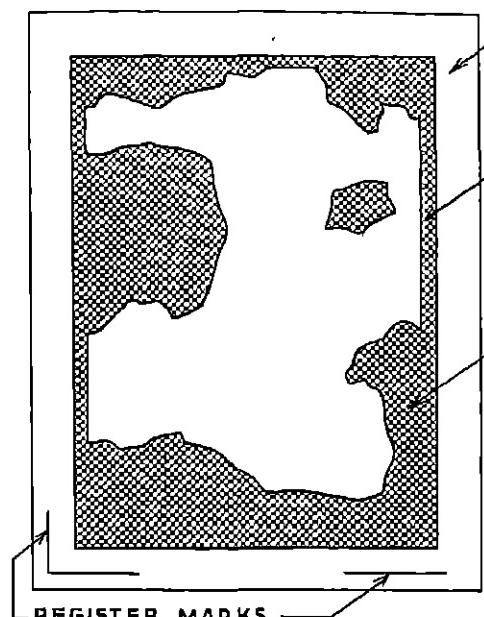
PLATE LXXX. LINOLEUM CUT IN BLACK AND TWO TONES OF GREY

block, so that it is not necessary to make elaborate frames or boxes for the purpose.

Plate LXXXIA, Fig. 1, shows the original tracing of the subject (in reverse ready for transfer to the block) with the register marks drawn in the margin. Fig. 2 gives a pictorial view of the block as it appears when cut and ready for printing with the register marks or boundaries left standing in the waste margin. Fig. 3 shows the sheet of damp paper in position for printing, fitted to the register marks, and Fig. 4 shows the print removed from the block with the margin round two sides of the print established by the distance of the register marks from those two sides of the block.

whilst in other parts the same wash will have one or more washes superimposed upon it. In this way they can analyse the colour scheme of the final print in the manner shown in Plate LXXXII, which gives the separate blocks to be used for the print which is shown first as a drawing (with the different colour areas shaded in various directions) and finally as the complete or reassembled print.

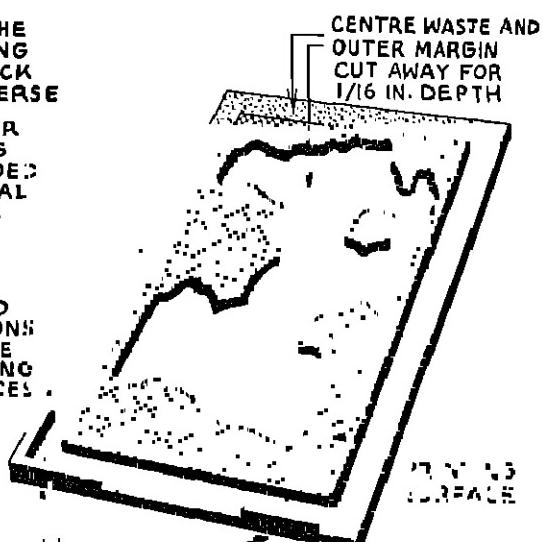
Plates LXXXIII, LXXXIV and LXXXV show examples of black-and-white and colour prints which are suitable for book illustration, calendars or rhyme sheets. It will be noticed that in most cases the pure technique of the linoleum block print has been used,



REGISTER MARKS
FIG. 1.

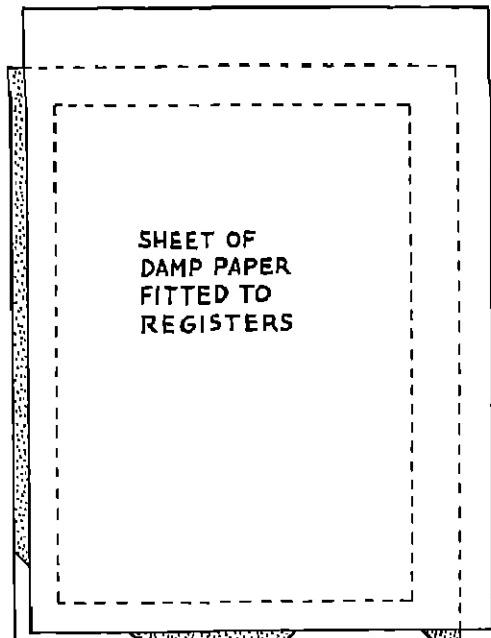
SHEET OF PAPER WITH THE TRACING OF BLOCK IN REVERSE
BORDER LINE IS INCLUDED IN FINAL BLOCK

SHADED PORTIONS WILL BE PRINTING SURFACES



REGISTER CORNER AND BAR
FIG. 2.

CENTRE WASTE AND OUTER MARGIN CUT AWAY FOR 1/16 IN. DEPTH



SHEET OF DAMP PAPER FITTED TO REGISTERS

FIG. 3.

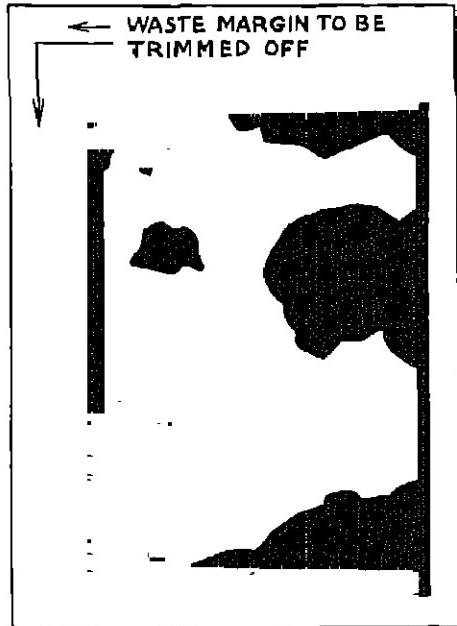


FIG. 4.

PLATE LXXXIA. INSTRUCTIONS FOR TRACING AND CUTTING A REGISTERED LINOLEUM BLOCK

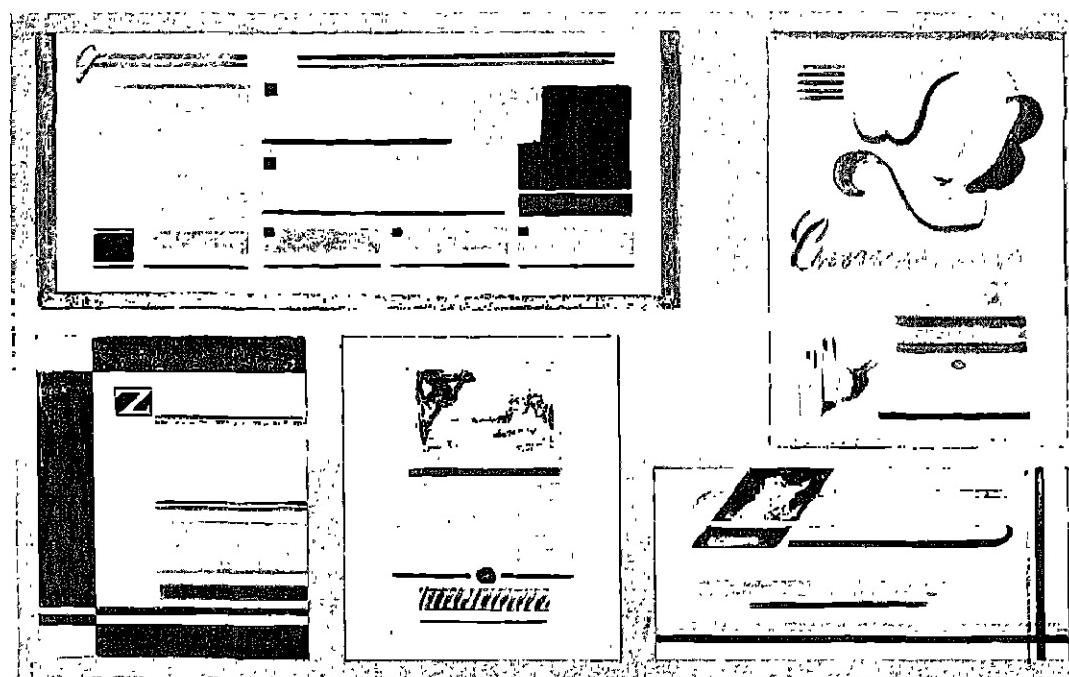
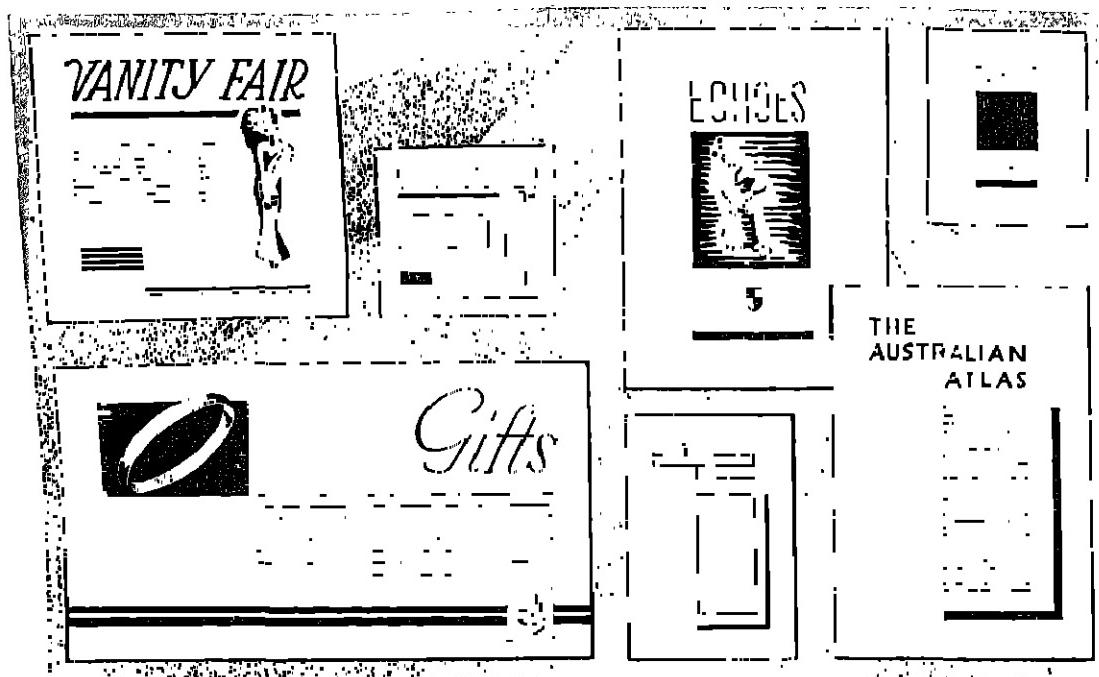


PLATE LXXXIB. EXAMPLES OF SIMPLE LAYOUT

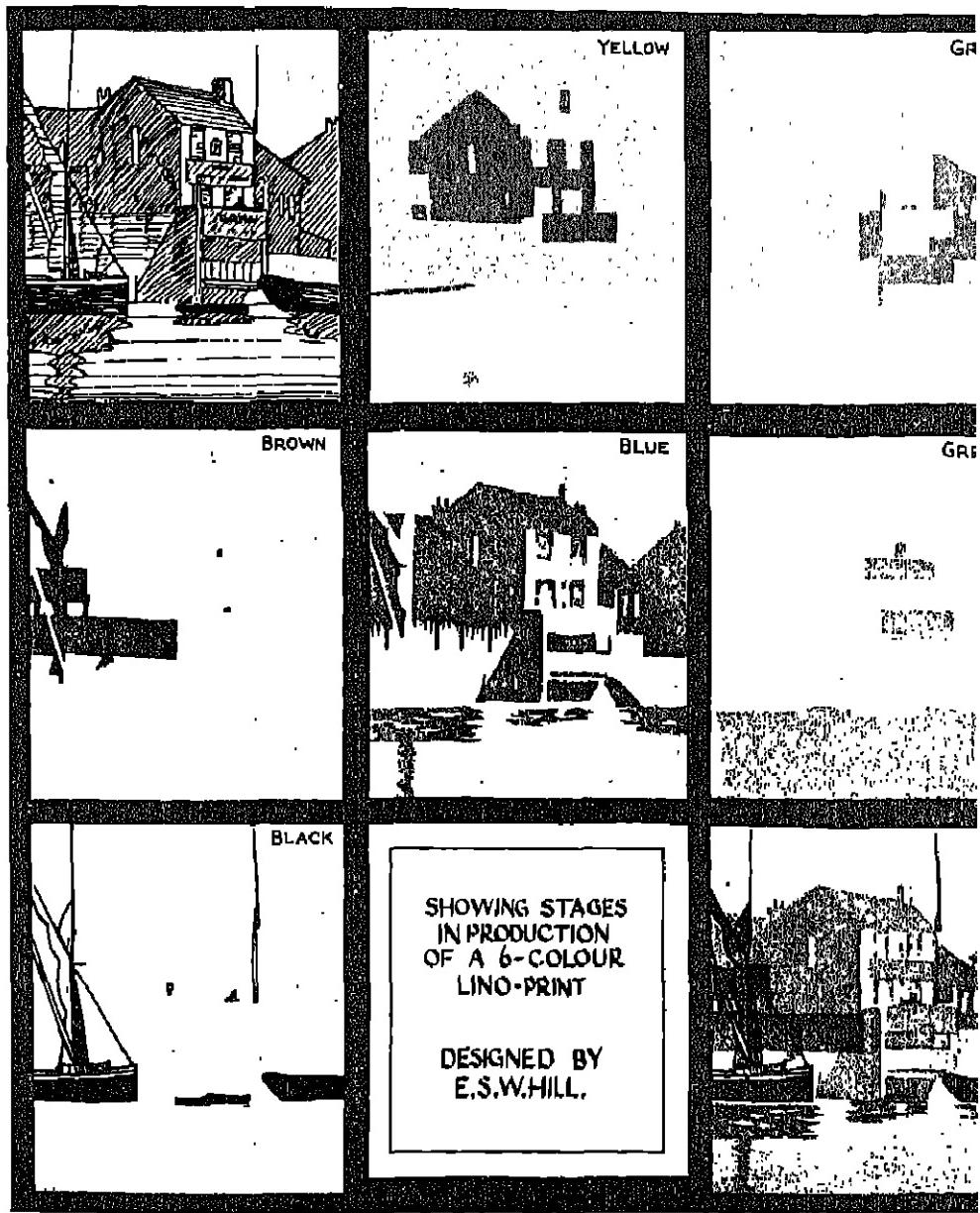


PLATE LXXXII. VARIOUS BLOCKS NECESSARY FOR PRINTING A COLOURED PICTURE

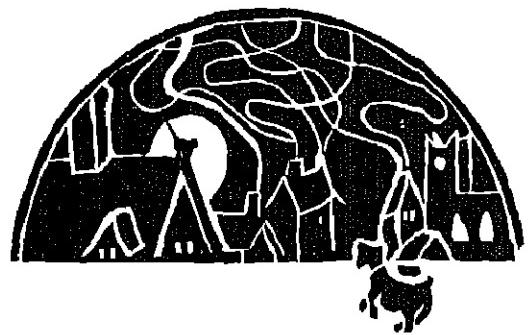


PLATE LXXXIII. LINOLEUM-BLOCK PRINTS IN BLACK ON WHITE

whereby the forms are represented by solid black areas and strong lines. In other examples there is partial representation of the form by white areas and lines which appear against a black background. This is shown by the lunette-shaped headpiece which is included in Plate LXXXIII, and the advantage of this method is the even distribution of weight that it gives to the print as a whole, combined with a delicacy which makes it suitable for the decoration of a page of lettering. A strongly patterned print with large areas of plain black and white would distract the attention from the lettering and would over-balance it if it appeared on the same page, although it might look quite satisfactory as an illustration mounted on the opposite page by itself.

Pictorial subjects may be treated very attractively in two or three tones of grey, with black, as shown in Plate LXXX. The children may obtain practice in registration in this way without encountering the added difficulties of colour printing. The order of printing such blocks is to work from the lightest tone value up to the darkest, or black, the last one being the "key block" and including the border line of the print.

Flowers and foliage details are excellent subjects for the first attempts at the registration of colour blocks as the colour areas are detached and are clearly defined in most cases. Plate LXXXVI illustrates a subject of this type which makes a decorative panel that is suitable for framing and mounting as a wall decoration.

Plate LXXXVII shows a linoleum-block print in black on white which is designed as a pattern of the counterchange type. The repetition of zigzag lines, combined with the disposition of the black and white areas, makes this an interesting and unusual example of the laws of pictorial design as applied to a decorative treatment in a medium other than paint.

All the examples illustrated here and in Class Picture No. 131 have been printed by the method described in detail in the second

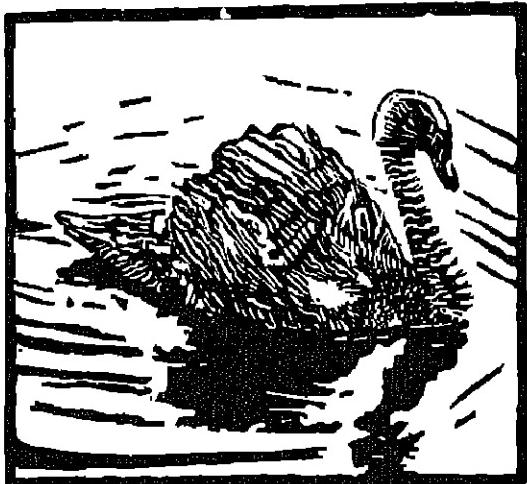
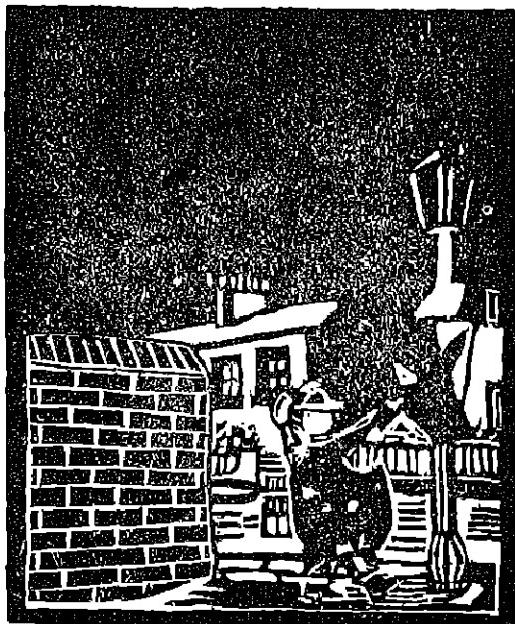


PLATE LXXXIV. LINOLEUM-BLOCK PRINTS IN BLACK ON WHITE

year course, using water colours and Gloy paste. Most of them were cut with an old penknife, the waste being removed by one small gouge.

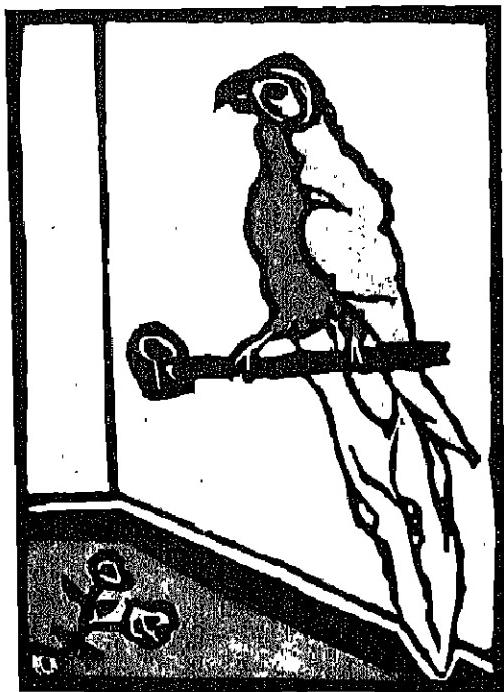


PLATE LXXXV. LINOLEUM-BLOCK PRINTS IN COLOUR



PLATE LXXXVI. LINOLEUM-BLOCK PRINT IN COLOUR

The illustrations shown in Plates LXXXVIII and LXXXIX were designed as single-page illustrations for a manuscript book. The subject was *London River*, and the blocks were made of such a size that they could be printed on blank pages of the book before binding up, so that the page would form a suitable mount for the picture. A book of this type is an achievement of which the child will be proud. It is something worth doing well, and in the course of its completion it will call for some knowledge of practically every branch of work that is covered by the art and crafts course. And when it is finished the child has something which is worth keeping.

When the time permits of more intensive

study, and the facilities are available, this branch of the work may be carried to a much more advanced stage by the inclusion of woodcuts for the purpose of book illustration. Plate XC shows two fine examples of this art, of which the chief characteristic is its delicacy of line. The wood-engraving is carried out with a diamond-pointed graver on the cross section or end grain of a piece of selected boxwood, so that the finest hair lines may be obtained. For beginners, however, it is advisable to use the side grain of a block prepared from pearwood from which quite good prints may be made, and to restrict the use of fine lines.

The more advanced linoleum-block prints in colour are most effective when they are used for decorative purposes in the home. Their style, technique and texture make them specially suitable for wall decorations place of pictures of the ordinary type, and the colour scheme of any particular block



PLATE LXXXVII. LINOLEUM-BLOCK PRINT WHICH IS ALSO A COUNTERCHANGE PATTERN



RH

H

PLATE LXXXVIII. FOUR LINOLEUM-BLOCK PRINTS OF A SERIES USED TO ILLUSTRATE A MANUSCRIPT BOOK

can be made to harmonise with the general scheme of the room in which it is to hang. The colour print shown in Plate XCI is designed for this purpose, for which architectural subjects are most suitable.

Poster designing.—This important section of the course should be included in the general illustration work. The laws of pictorial composition apply equally to the poster and

not merely something which has been added to it afterwards.

The earlier exercises in cut paper work which have led up to this stage will prove to have been invaluable as a preparation for poster designing, and papers should be used during the third year both for the saving of time and to ensure the simplicity of form that is necessary. They may, of course, be used in addition

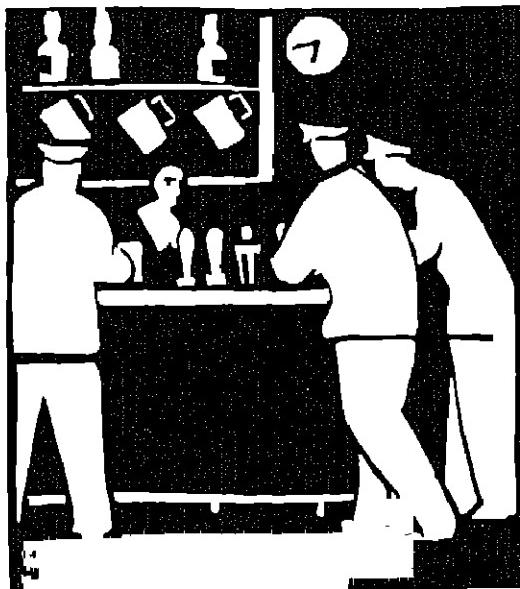


PLATE LXXXIX. TWO OTHER ILLUSTRATIONS FROM THE SERIES REFERRED TO IN PLATE LXXXVIII

to the picture, although the technique of poster designing is very different from that of the general illustration work.

Before starting upon a poster design the children should know something of the aims of this class of work, which are to express clearly the subject matter of the poster by a good arrangement of lettering, assisted, if necessary, by a suitable design in strong and simple forms having a bold colour scheme. The two most important points are clearness of presentation and simplicity of form. The next most important point is that the lettering is part of the poster design and

to poster colours when the range of the papers is too narrow for some particular purpose.

Poster designs should be roughed out in pencil at first, using strong outlines for the darks and line shading to represent the different tone values. The range of these should be restricted so that the whole poster may be worked out in about four values, irrespective of the hues which will compose any one value. This simplification will be found to assist the children to select a bold but well-balanced colour scheme, and Plate XCII shows the first detailed stage



[Reproduced by courtesy of R. G. Broadhurst, Esq.]

PLATE XC. WOODCUTS

of a poster design with the values represented by pencil lines.

Plate XCIII shows three dissimilar designs which have been worked out along these lines. The smallest one, having the lettered title, is in poster colour and is intended for a showcard or window ticket, while the others are carried out in coloured papers.

Simplicity of form is the keynote of the poster design on Plate XCIV, along with a striking colour scheme in paper. This subject proves beyond all doubt the absolute necessity for instruction in design and colour "in the flat." Faced with the com-

mand to "design" a poster for such a subject, the child will naturally draw the face and "shade it in" in the attempt to get the lifelike modelling. The result will be anything but a poster, even though the drawing might be fairly accurate. If, on the other hand, a member of the class is posed before a strong side light and the children are instructed to outline the darks only, ignoring the half tones and the extremely dark accents in nostrils and eyes, an impression of the head is obtained which is much more suitable as a basis for a poster design. Drawing practice is not lost by this method, as intense concentration and observation is needed on the part of the children to enable them to sort out the complex tone pattern of the head into two values only. In conjunction with the rapid figure sketching, exercises of this type will help the children to widen the field covered by their attempts at poster work with much greater chances of success.

It is not contended here for one moment that serious figure drawing should be conducted in this manner but, as it is out of the question in view of the shortness of time that is available, this method will at least be of more use to the children than would a hopeless attempt along more conventional lines. The purpose of this method is to enable figure drawing to be introduced into poster work in a reasonably successful manner.

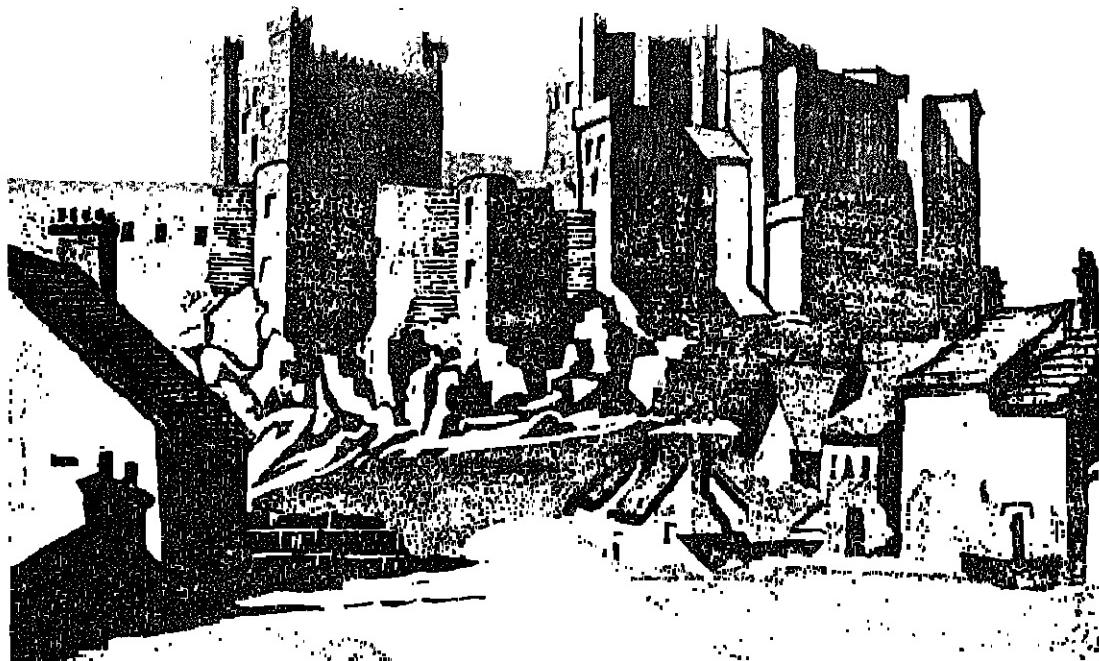
The example shown is carried out on a sheet of "warm grey" paper so that the grey forms the background area within the boundary lines of the poster.

Plate XCIV illustrates an example of the use of a closely related scheme, in both colour and tone, balanced against a black background. The lettering plays an all-important part in the design of this poster, and for that reason the lower band of letters is done in black. Poster colours were used for this example as the papers could not provide the desired scheme.

The inclusion of the essential lettering within the panel of the poster itself produces

a somewhat different type of design from those which have so far been illustrated. The four designs in Plate XCVI show the way in which the attempt has been made to make the lettering conform to the structural lines of the design which, in turn, are based upon the form of the subject matter of the poster. Cut paper is an unsuitable

The forms of both the subject matter and the lettering are either stencilled or edge-stencilled upon a tinted ground paper, or a decorative paper such as that used for the endpapers of a book. Certain kinds of wall paper are quite suitable for this treatment and the effect which is achieved is one of "modernism" along with extreme



[Reproduced by courtesy of R. Barron, Esq.]

PLATE XCI. LINOLEUM-BLOCK PRINT IN COLOUR: BAMBURGH CASTLE

medium for lettering, so that these exercises are carried out in a combination of poster colour and ordinary water colour. If designs are to be exhibited out of doors they should be done in waterproof show-card colours.

An entirely different technique is adopted to produce the posters shown in Plate XCVII.

simplicity. The examples shown are satisfactory as posters because they attract the attention by reason of their unusualness but at the same time they explain the subject matter of their designs quite clearly.

A bold colour scheme on a dark grey background, combined with a decorative

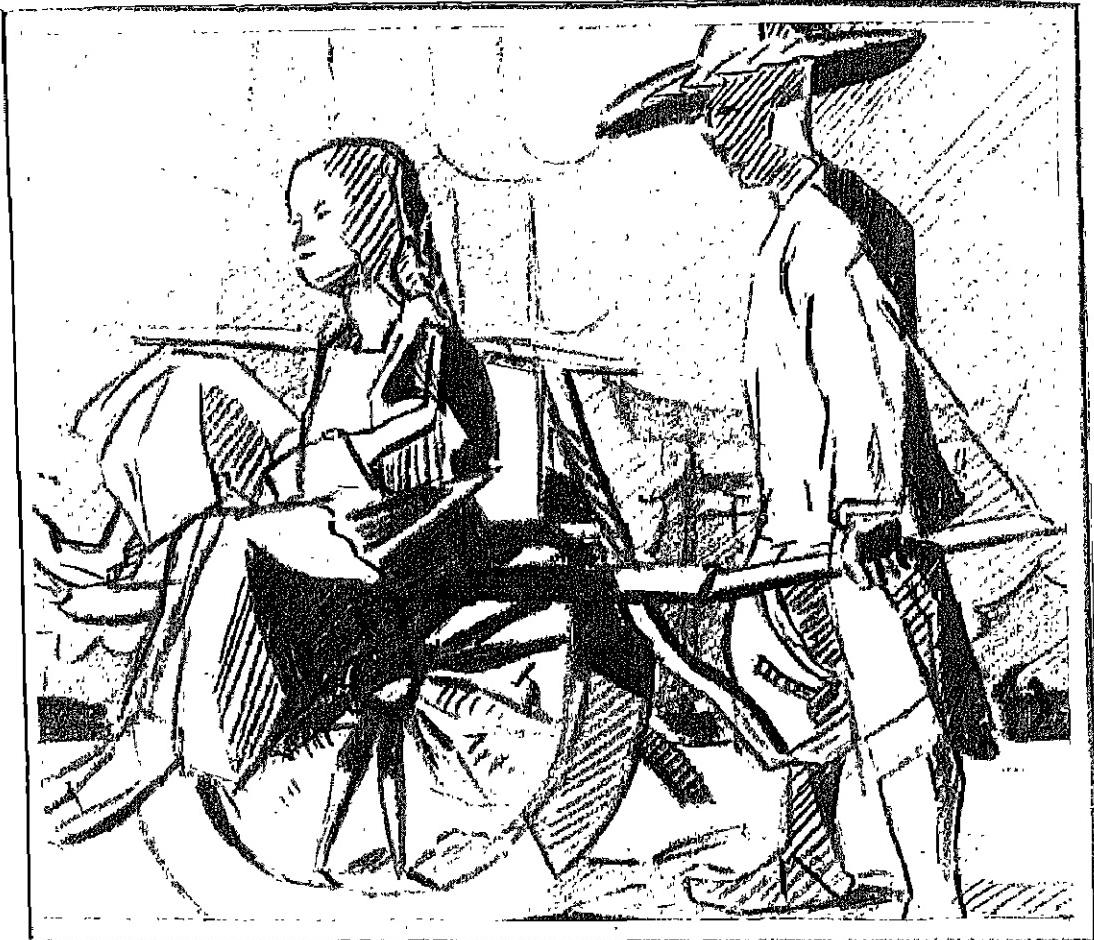


PLATE XCII. PENCIL SKETCH FOR POSTER DESIGN

treatment of the clouds and sea, is used for the type of poster shown in Plate XCIII. This method is suitable for a limited range of subjects of the mechanical kind which deal mainly with methods of transport, probably because of the harshness and severity of the style. In contrast, the softer treatment of the poster shown in Plate XCIX suits the subject matter admirably, although the design is equally decorative in style as compared with that of the previous example. It is carried out in a pleasant colour scheme of reds, blues and greens upon a warmly tinted ground of "biscuit" colour.

The examples which have been illustrated make it clear that the subject matter of a poster should always be considered before the decision is made to adopt any particular style or technique. The cut paper work which has been practised throughout the course should lead up to the actual poster designs, in preparation for these different styles, and a number of examples are given in Class Picture No. 132 which show how the simple colour training may be combined with these preparatory stages. Wide though the range of subjects may be there is no deviation from the rule that the

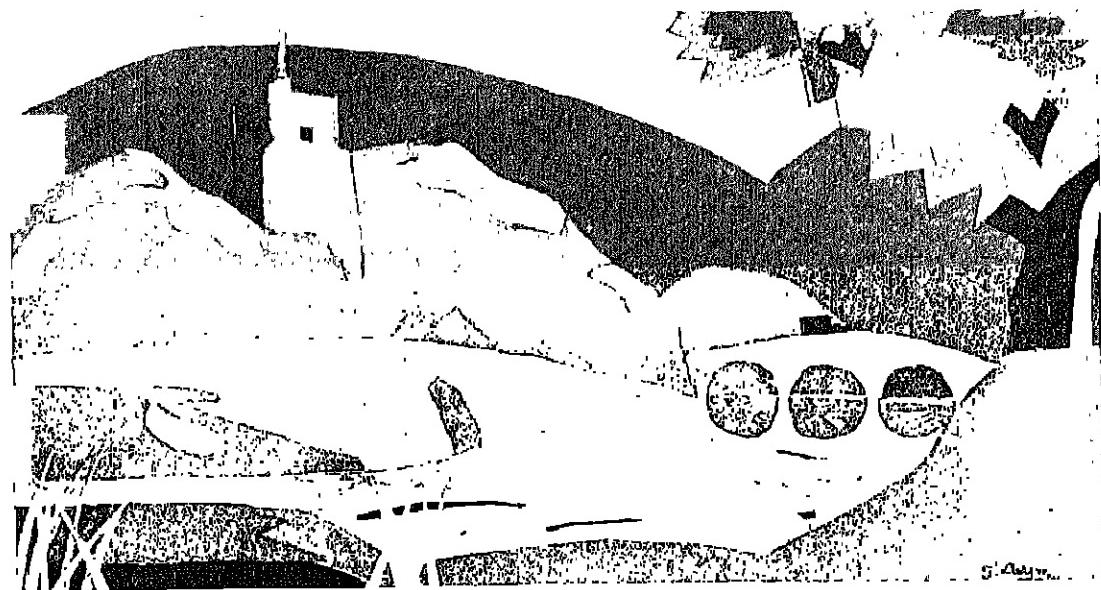
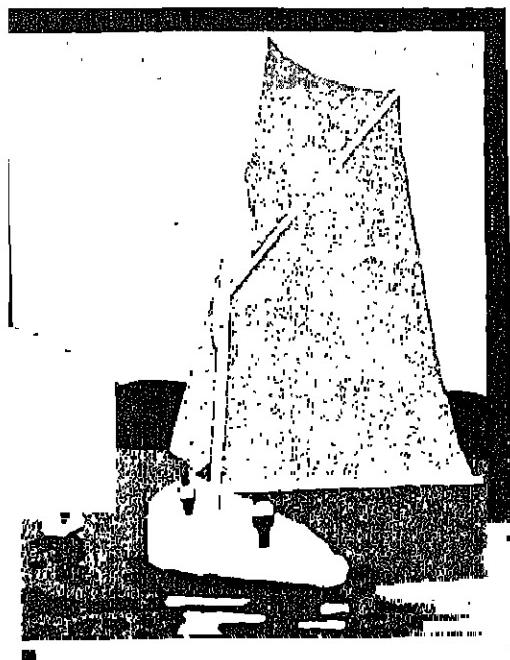


PLATE XCIII. THREE POSTER DESIGNS



PLATE XCIV. POSTER IN CUT PAPER

essentials of poster designing are clearness of statement, strength of design, suitability of technique, avoidance of all unnecessary detail, simplification of form and boldness of decorative colour treatment.

Decorative panels.—This final form of the illustration work of the course may be regarded as the test of all that has gone before. It is at the same time the most exacting and the most useful form that can be taken by the illustration, using the term in its wider sense. Panels are not usually of the normal pictorial proportions and therefore they are more difficult to compose, whilst the fact that they are to be used for the specific purpose of decorating a wall space makes it necessary that the style of treatment shall be suited to the positions which they are to occupy. A realistic picture of the "easel" type would give the appearance of there being a hole in the wall, and therefore the panel should be frankly

decorative in style with a colour scheme that harmonises with the surroundings.

It is seldom that the painting may be carried out directly upon the wall surface. In most cases this would be inadvisable owing to the danger of its being damaged, or even being entirely obliterated by school decorators during the holidays. A better method to adopt is that of painting the panel on a sheet of Upson or some similar prepared board. This can be mounted on the wall concerned in such a way as to be barely noticeable as an addition to the existing surface, so that it can be removed at any time.

These panels may be painted in tempera colour, poster colour, oil colour, ordinary decorator's oil colour, or ordinary distemper. The treatment is mainly, though not necessarily entirely, in the flat, and the colour scheme should be restrained. A related scheme is most satisfactory as it does not tend to stand out from the wall surface as



PLATE XCV. POSTER DESIGN IN RELATED YELLOW SCHEME ON BLACK GROUND

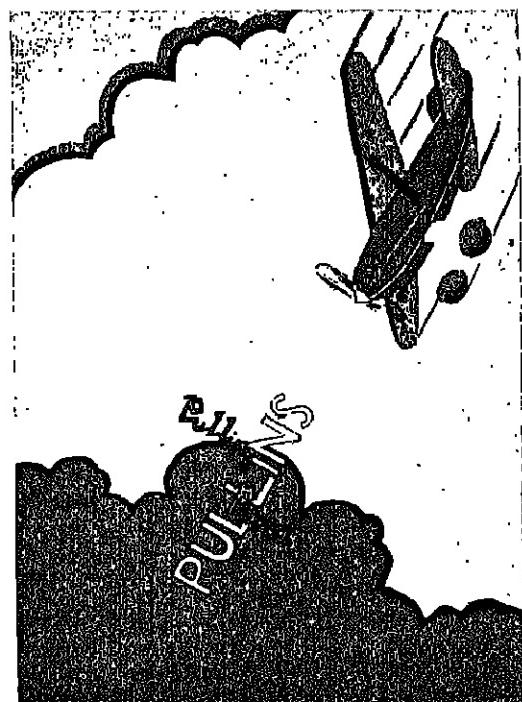
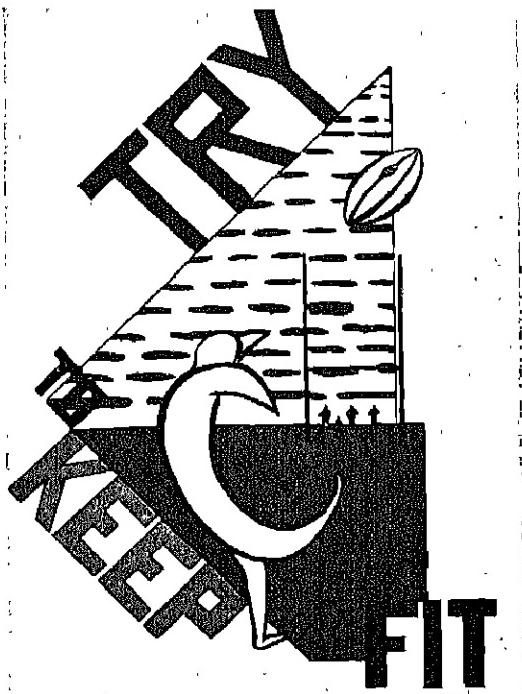
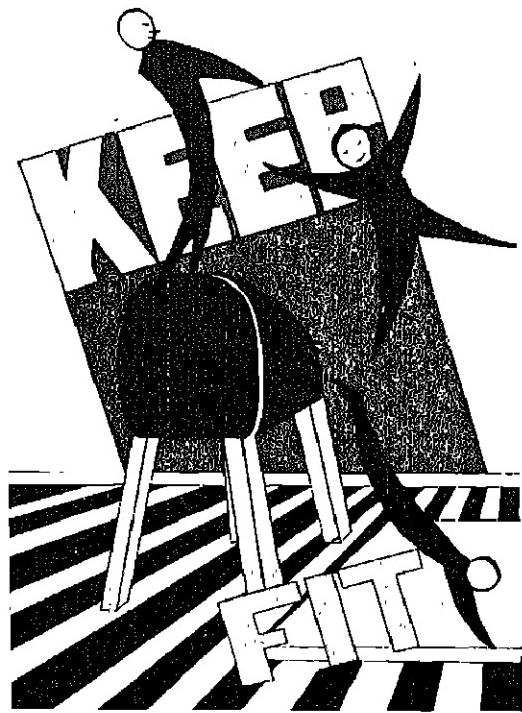


PLATE XCVI. FOUR POSTER DESIGNS WHICH INCLUDE THE ESSENTIAL LETTERING WITHIN THE BORDERS



PLATE XCVII. TWO POSTERS SHOWING THE USE OF EDGE STENCILLING



PLATE XCVIII. POSTER DESIGN INCLUDING THE USE OF BODY COLOUR AND PASTEL IN A BOLD STYLE

would be the case with a strongly contrasted scheme. For the same reason the tonal scale should be more restricted than that of the average picture. If a colour scheme of walls and furnishings already exists, that of the panels may be in keeping with it; or the panels may have a common related scheme which is in contrast with that of

finished work and to enable the composition to be decided upon in its final form before the actual panel is begun. When the cartoon is finished it is squared up with guide lines at suitable intervals. These lines are repeated on the panel, to the larger scale, so that the preliminary drawing of the subject may be reproduced exactly and without difficulty



PLATE XCIX. POSTER DESIGN IN WATER COLOUR ON A TINTED GROUND

the room. In any case, the starting point should be the room itself and not the panels.

To design a panel of this type it is necessary to make a preliminary drawing on paper to the exact proportions of the panel but on a smaller scale. This drawing, known as a "cartoon," is done for the purpose of obtaining an accurate impression of the

to the full size. This final drawing may be done in charcoal, which should be fixed before the painting begins.

Two cartoons for large wall panels are shown in Plate C. The upper example is an arrangement of mechanical forms—cars, speedboats, engines, etc., which are disposed to make an abstract pattern. The boy who

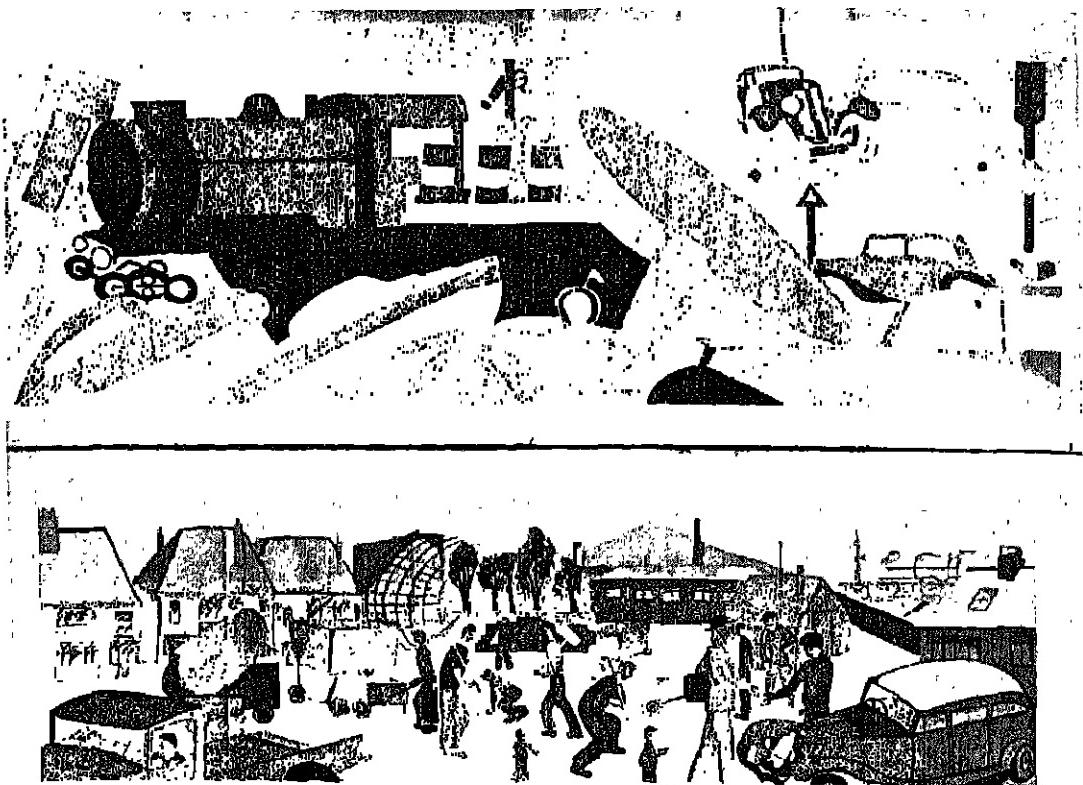


PLATE C. TWO CARTOONS FOR WALL PANELS



PLATE CI. DECORATIVE PANEL IN TEMPERA COLOUR DESIGNED FROM SKETCHES MADE FROM LIFE

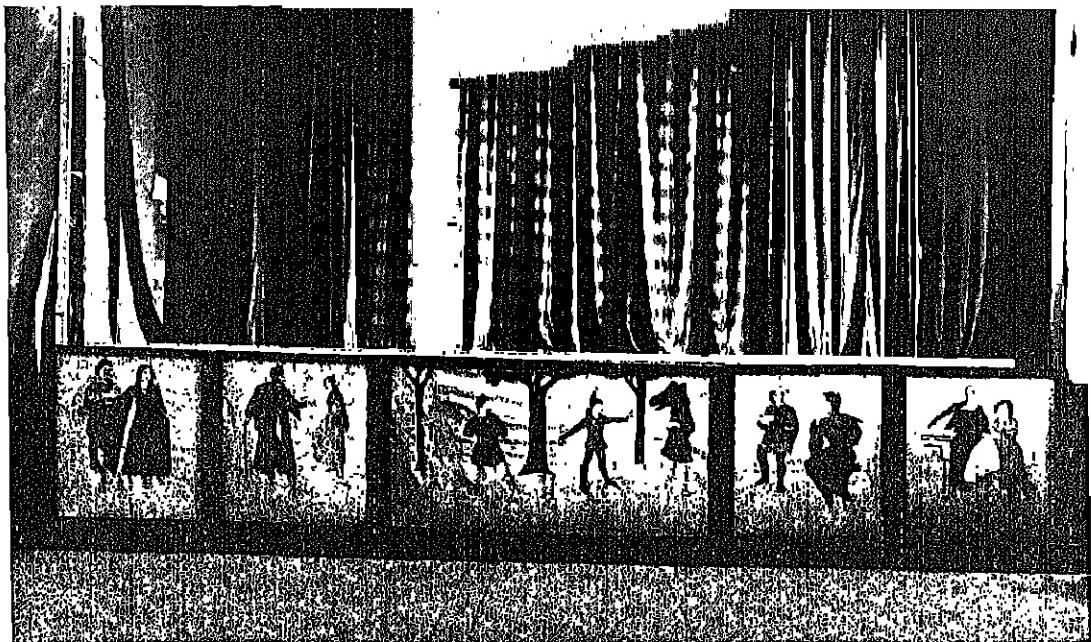


PLATE CII

Above : Panels in appliquéd felt on a neutral ground.
Below : Stage setting, scenery and costumes carried out by the children themselves.

designed this panel was not consciously endeavouring to be "modern," but he was trying to make a pattern of all the mechanical forms that he could draw from memory. When seen in colour the panel is very effective as a design of this type.

The lower panel is a straightforward attempt to utilise local features which include a mine "tip," coal tubs, miners and

sketches made either in the playground or the classroom. The panel is painted in tempera colour; the background areas in a related scheme of grey-green against which the gay colour notes of the figures are shown to the greatest advantage. There is a feeling of rhythm about the composition which, combined with the pleasant colour, makes this a most satisfying wall decoration.



PLATE CIII. USE OF STAGE LIGHTING

A large wooden frame surrounds the opening within which the figure is seated. By using a "dimmer" the whole "picture" is faded out, and by using coloured spotlights the "picture" appears blue and gold.

children, lorries, railway details, a few trees and the small houses which make up a mining community. Again, this is quite effective in colour, although the centre of the design is too "spotty" to make a really good composition.

Plate CI shows a panel designed by a senior girl and based upon sketches made on the spot for the background, and figure

Stage decoration.—This branch of senior school activities now plays an important part in the general practical work of the art course. It is closely related in character to the painting of wall panels and to other similar decorative aspects of the work. It is really a subject in itself and it is only possible to touch upon it here, as another form of the illustration section of the course.

The panels shown in Plate CII are carried out in appliquéd coloured felt on a light neutral ground. They represent Shakespearean characters, and the series of panels decorate the front of the stage which has been built by the boys and has been fully equipped by them with lighting facilities, etc. The lower illustration on the same Plate shows a scene from a play which was presented on the stage of another school. The whole of the sets for this play, including the interior shown in the photograph, were painted by the children on canvas screens in the usual way. Decorator's powder colours were used, mixed with size, and the work included the painting of the property picture and the other properties such as the fireplace and bookshelf. The scenery can be stored for future use, so that it becomes not only a most valuable part of the art course but also a useful addition to the practical activities of the school and an aid to the teaching of other subjects.

By a clever arrangement of lighting the figure seated in Plate CIII is presented to the audience as a decoration in blue and gold. The use of some form of dimming apparatus in the light circuit makes it possible to carry out a number of interesting experiments in colour.

PATTERN DESIGN

Less time is spent on pattern designing during the third year. The work is mainly incidental to the practice of the crafts, so that every pattern which is designed during this period should be applied either to the bookcrafts, the weaving or the fabric printing.

The patterns will naturally be more advanced than those of the second year in the planning of the units and their relationship to the background. Very complicated units are not necessary, neither are they desirable, but originality of outlook as to the choice of subjects for units should be encouraged.

Plate CIV shows two patterns which are based upon widely differing types of unit. In one case the unit consists of a small cottage with surrounding detail in contrasting tone and colour values, whilst the other pattern shows the influence of local interests in the choice of subject, that of a miner at work. Both patterns would be suitable for use as endpapers or box cover-papers.

The two patterns shown in Plate CV are more intricate in unit detail and would require to be printed on a larger scale to show to the best advantage. They are for colour block repeats on a lightly tinted or "natural" fabric ground, and for this purpose they would have to be registered in a manner similar to that which is used for the linoleum-block prints. Instead of the upraised register marks left standing in the waste margin of the linoleum, a template is cut in thin card which may be moved into position for each unit to be printed on the stretched fabric. The block on which the linoleum unit is mounted has been trimmed carefully to size, as before mentioned, and the template is cut so that the

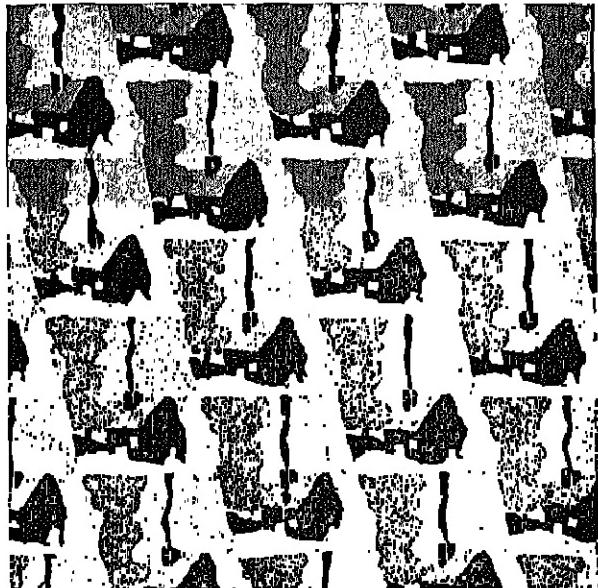


PLATE CIV. UNIT-REPEAT PATTERNS BASED UPON DEFINITE SUBJECTS

*Above : The miner.
Below : The cottage.*

block fits accurately to the right-angled or splayed corner as the case may be. This simple method enables the successive prints to be registered quite accurately, and a little practice on a piece of waste material will soon make the method clear to the children.

LETTERING

The scope of the lettering and manuscript writing should be widened during the final year to include more application to book production. The possession by a school of a printing press will enable work to be done



PLATE CV. BLOCK-PRINTED PATTERNS, USING A STRIKING COLOUR SCHEME

Plate CVI shows a single block print in dull red repeated on a ground of gold-coloured fabric. The subject of the unit design is *Frogs*, and the printed fabric has something of the delicate quality of a Chinese silk, which it owes partly to the colouring and partly to the rippling movement of the linework on the block.

of a very high standard and of a type which cannot be attempted otherwise. The course details should be adjusted to the conditions, time and equipment that may be available in a particular school.

Book production may be carried out in a small way without the advantages of a press. A group of the best senior children

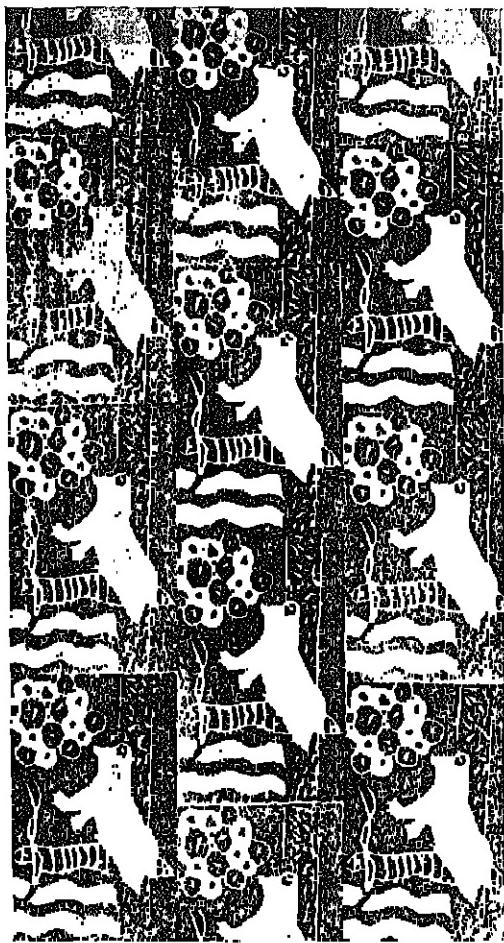


PLATE CVI. A SINGLE BLOCK-PRINTED REPEAT IN DULL RED ON A GOLD FABRIC GROUND

may write, illustrate and forward a book of quarto size or even larger, on a subject dealing with local history, customs, etc. The other children may assist in this work by preparing suggestions for title pages and illustrations upon which the final designs may be based. They should not be made to feel that they are excluded from the work of the chosen group which has the project in hand, but rather that the final result is due to their combined efforts.

In addition to this main aim, smaller individual exercises may be carried out and

may be based upon the work of the second year which has already been illustrated. Folders, rhyme sheets, posters and labels will all be required during this period.

The first lessons during this year will be concerned with marginal arrangements of pages of lettering, balance, and the use of head and tail pieces for the decoration of selected pages. Plates CVII and CVIII show the use of each of these devices. The block of lettering on the plain, lettered page is balanced by the page number in the lower corner, whilst the marginal widths are arranged to allow the page to act as a mount for the lettering block and to show it off to the best advantage. A page of this type is much more effective when it is

For it is the whole-hearted enjoyment which comes with growing powers of appreciation that gives painting, and indeed all art, its fascination for most of us. Sympathy, and whatever of the artist there may be in each of us enables us to read something of our own into the most perfect picture ever painted, something of which even the painter never dreamed....

page two

PLATE CVII. BALANCING THE PAGE



A landscape usually requires the selective hand of the artist to adapt it to pictorial form. And however closely the painter may keep to his subject, he has his own individual manner of seeing things in landscape as in portraiture, and no two painters will see alike. At the same time every painter identifies himself with some particular type of scenery, in his work



PLATE CVIII. USE OF HEADPIECE AND TAILPIECE ON A PAGE

left free from decorated initial letters, borders or other attempts at illumination. The standard of work that is required for successful illumination of a lettered page is so high that it is best to omit this branch of the decorative arts from the school course altogether. Years of steady training are necessary before the required skill and knowledge can be obtained with which to do correct work, and a good page of plain lettering is worth much more than an ornate page of badly done and wrongly designed details which have been assembled haphazardly from the styles of various periods and different countries.

The illustration on Plate CVIII shows a more closely lettered block of text to which has been added a headpiece and a tailpiece,

RAMBLES IN ESSEX

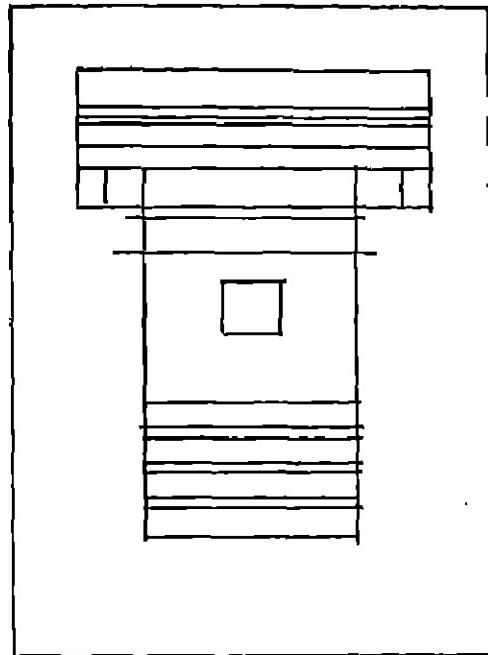


A.WALKER

PLATE CIX. PLANNING OF A TITLE PAGE, USING A BALANCED ARRANGEMENT ROUND A DECORATIVE UNIT

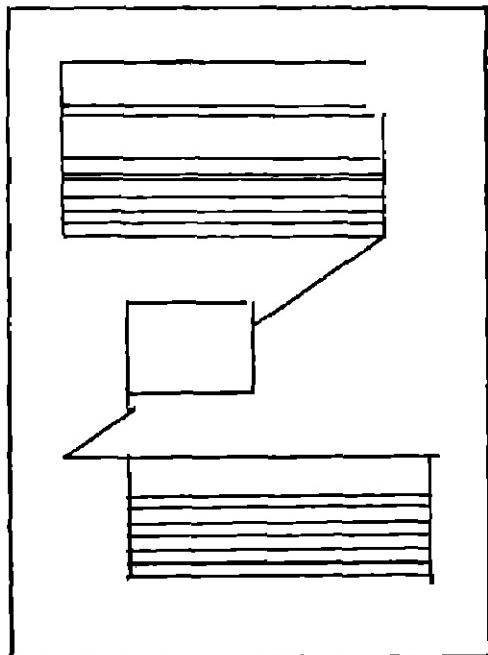
the whole being centrally disposed upon the page. These devices should be drawn to suit the weight of the lettering to which they relate, or they may be printed from linoleum blocks which have been designed for the purpose.

Title pages give excellent practice in the layout of simple blocks of lettering and the use of suitable devices for balancing purposes. The lettering may be pen-written or it may be drawn in the sans-serif style as shown in Plate CIX. In this case the letters have to be drawn in outline and filled in with a brush. The decorative device is really a miniature poster, designed to suit the subject matter of the title and to suit the weight of the lettering and its position on the page. Other forms of title



AUSTIN REED
OF REGENT STREET
SPRING STYLES

IN ALL THE
DETAILS OF
A COMPLETE
WARDROBE



MODERN
INTERIORS

demand a modern
outlook in design



BOWMANS
are specialists in
the modern furniture
and fabric styles

PLATE CX. FIRST EXERCISES IN SIMPLE LAYOUT: SHOWCARD DESIGNS OR WINDOW TICKETS



W I N T E R

When icicles hang by the wall
And Dick the shepherd blows his nail,
And Tom bears logs into the hall,
And milk comes frozen home in pail;
When blood is nipt, and ways be foul,
Then nightly sings the staring owl
Tuwwoo!
Tuwhit! tuwhoo! A merry note!
While greasy Joan doth keel the pot.

When all aloud the wind doth blow,
And coughing drowns the parson's saw,
And birds sit brooding in the snow,
And Marian's nose looks red and raw;
When roasted crabs hiss in the bowl—
Then nightly sings the staring owl
Tuwwoo!
Tuwhit! tuwhoo! A merry note!
While greasy Joan doth keel the pot.

[Reproduced by courtesy of R. C. Broadhurst, Esq.]

PLATE CXI. BOOK PRODUCTION: TYPESETTING, PRINTING AND WOODCUT DECORATION



Mulcaster, the first headmaster of Merchant Taylor's School, made declarations which for his period (1531 to 1611) were very remarkable and pointed the way to the coming contest for the freedom of the child. He emphasised the necessity of giving special attention to the study and education of the very young child. He submitted that more attention should be

[Reproduced by courtesy of R. G. Broadhurst, Esq.]

PLATE CXII. BOOK PRODUCTION: TYPESETTING, PRINTING AND WOODCUT DECORATION

pages may have the author's name included in place of any decorative device, but in any case the purpose remains the same; that is to act as the fulcrum or balancing point for the upper and lower blocks of lettering. If the author's name is used at this point it is customary to insert the name of the publisher in the lower block. This method of title or cover-page arrangement has already been referred to as an example of balance obtained by use of the principle of the steelyard.

Another useful and interesting adaptation of the same principle is seen in the showcard or window-ticket designs in Plate CX. The diagrams accompanying the illustrations show how the design is begun as a balanced but abstract arrangement of lines which represent the blocks of lettering. Exercises in simple layout give excellent practice in the spacing and planning of lettering, as the wording must begin and finish exactly to the side lines. This means that the essential wording must first of all be roughed out on paper to get an idea of the approximate space that will be required for it. The number and position of the blocks of lettering will then depend mainly upon this necessary allotment of space, so that it is from this point that the complete layout must begin. In short, the design should be made to suit the lettering, which should not be either cramped or distorted to suit the general layout.

Once the subject matter of the showcard has been written down and the first suggestion for the design has been roughed out on a sheet of paper, the really difficult part of the exercise begins. It is necessary to make minor alterations to the wording and to the size of the lettering to produce a satisfactory design, and these stages give very valuable practice in obtaining conciseness of expression with a good arrangement.

These cards and tickets should be drawn as directly as possible with the lettering pen, the brush or an ordinary pen. The two examples shown illustrate a slight deviation

from the normal Roman letters, and these "skeleton" forms should be the limit to which the children should be allowed to go as regards the use of "fancy" alphabets. Teachers who wish to develop this side of the work and carry it to a more advanced stage should study the books on modern lettering and layout written by Cecil Wade and published by Messrs. Pitman & Sons, Ltd.

If the possession of a school press with suitable founts of type allows typesetting and printing to be done, a much higher standard of book production may be reached. Linoleum blocks may be used for illustration if they are mounted type-high before being set up, but woodcuts and wood engravings will give the best appearance to the work. Plates CXI and CXII show two pages for book production which were designed and printed in a London central school, and these examples illustrate the high standard of work which it is possible to obtain when sound teaching is assisted by the provision of adequate equipment.

OBJECT DRAWING IN WATER COLOUR

For reasons that have been stated already, it is seldom that this work is carried on in the school with any degree of success, although it sometimes happens that a group of children shows an aptitude for the drawing and painting of objects. When this is likely to occur the signs will become evident during the first year's lessons in drawing, and the second year's exercises in tone washes. A skilful teacher who is interested in the formal side of art teaching rather than in the expression and illustration work will be able to get good results by devoting more time to this aspect of the water-colour painting.

The children may be able to mix their colour correctly and to apply washes of various kinds in the correct manner, but still they may not be able to represent a group of objects of simple form. It is the

method of painting a group of objects or a scene that is all important at that stage of their progress.

It has been indicated earlier in the text and on Class Picture No. 140 in colour that it is necessary to paint the picture as a whole and not piecemeal, and this is the secret of successful progress once the skill in laying a wash is obtained. Class Picture No. 136 includes several examples of more advanced work which was carried out in this way, and if these reproductions are studied carefully it will be seen that the warmer and lighter washes have been carried across the forms of individual objects and their surroundings, underneath the subsequent washes which may determine the outlines of these forms.

The procedure may be summed up as a progression from large, warm and light washes to small, dark and often colder washes. No more than three washes should appear at any one point as superimposed one upon the other, as this will cause the earlier washes to "lift" and will result in muddy colour and dirty, hard-edged patches in the last wash.

The children should be taught to look at the group as a whole and to regard it at first as a series of shapes in light and dark. The preliminary pencil drawing being furnished, these darks may be indicated lightly in pencil by drawing the outline of their boundaries, irrespective of the outlines of individual objects, and shading in the dark areas with a series of light pencil lines which may just show through the first wash. The tone pattern of lights and darks is now made clear on the drawing.

The first wash is now applied after testing the various mixtures that are to be used on scrap paper. Allowance must be made for the fact that the water colour dries several tones lighter than it appears when it is first washed on. As suggested before, and as shown in the reproductions on Class Picture No. 136, this first wash will consist of a variety of flat, broken and graded washes all run in together, the different parts of the whole wash, representing the local colour of

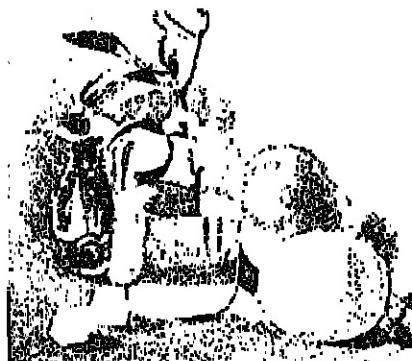
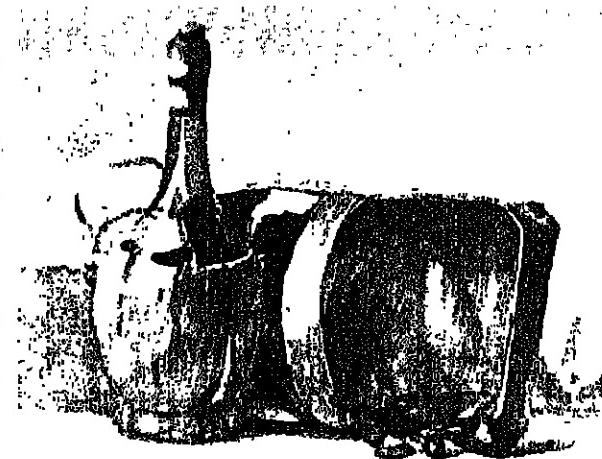
background and objects, being altered as these changes occur. This is a difficult task, needing intense concentration and a sureness of touch that depends upon the child making up his or her mind at once as to the nature of the change. By thinking a little way ahead of the brush many mistakes may be avoided, and there is plenty of time for the wash to be executed properly if this fore-thought is observed. This first general wash is the test upon which the final painting must depend for its success.

It helps to pull the painting together and to achieve unity of effect if the colours are allowed to run together somewhat at this stage. When a sharp division of form and colour is needed the wash should be stopped at the outline concerned, being resumed in the fresh colour but being separated from the outline by a narrow space of untouched background paper. These points in the painting at which clear and sharp outlines are seen should be noted before the painting starts, as they are most important. A painting which has nothing but merged and softened outlines will look weak and "woolly," whilst one which has nothing but hard outlines will look unnatural and patchy. Children incline towards the latter error in their paintings, owing to their tendency to paint the picture in pieces.

The gradations and half tones have been provided for in the first general wash.

Colour of stronger tone is mixed for the second washes, allowance being made for warmth or coldness and for the effect of the first wash showing through or influencing the superimposed washes. These washes will include the shade and cast shadow areas which have already been indicated in pencil, and which are to be seen showing through the first wash. They should be laid lightly and deftly, each part of the wash only being gone over once. Many of these smaller washes in cold colours such as green or blue will be "qualified" or greyed slightly by the first wash, which probably consists mainly of yellow ochre.

The final series of small washes should be



DRAWINGS OF NATURAL AND COMMON OBJECTS IN WATER COLOUR
(Class Picture No. 136 in the Portfolio.)

restricted to the cast shadows, which are the darkest tonal areas, and the accents of intense hue or tone. They should be touched on as blobs of colour and should be left alone once they are on the paper. The painting is now complete, having been built up in successive stages of tone and colour.

Unfortunately, it is not always so straightforward as would appear from this description. It often happens that a mistake is made during the first wash or some portion of a wash has to be lightened or removed altogether; or it may be that when the painting is finished it looks too hard and strong in both tone and colour as a whole,

or in one part. In this case it may become necessary to resort to the process known as "washing out."

If a portion of a wash is too intense or needs to be removed for other reasons, it should be damped with clean water. After it has been thoroughly dampened the particles of pigment are loosened from the paper and the whole of the dampened part can be removed by pressing on it firmly with a piece of blotting paper, or by stroking it with a damp, clean brush. If the wash has only just been applied, so that it is still wet, the colour can be wiped off with a damp, clean brush alone, or with a piece of rag or cotton wool.

If, on the other hand, the whole painting is too harsh in tone and/or colour, or the outlines of certain washes are too hard, it should be "washed down." This process removes a small amount of pigment from the surface of the paper, but its chief effect is to merge together the adjacent washes and to soften their outlines.

The painting is sloped at an angle of about thirty degrees and, being quite dry, is ready for the washing down. A full brush of water is laid quickly along the top edge. The brush is recharged with clean water which is applied to the surface of the painting by a series of firm, parallel and vertical strokes. These should be carried right across the top of the painting, the brush being re-charged at frequent intervals. No two successive strokes should cover the same part of the painting, as this would cause the colour underneath to be lifted entirely from the paper.

The process is continued by working quickly across the painting, from side to side, with each row of strokes, so that the washing down proceeds from top to bottom. After the last row of strokes has been made, the painting should be left at the same angle to dry. The surplus water will collect at the

bottom edge where it may be taken off with a clean, damp brush.

Occasionally it is necessary to float a light wash of colour over the whole of a painting, either to qualify its colour or to alter its tone values. The same procedure is adopted as for washing down, but care should be



PLATE CXIII. FREE TREATMENT OF OBJECT DRAWING
IN WATER COLOUR

taken to see that an ample supply of colour is mixed for the purpose as it is impossible to stop in the middle of such a wash, mix up fresh colour, and then resume the wash without any damage being done to the painting. Moonlight effects are best done in this way, the subject being painted first

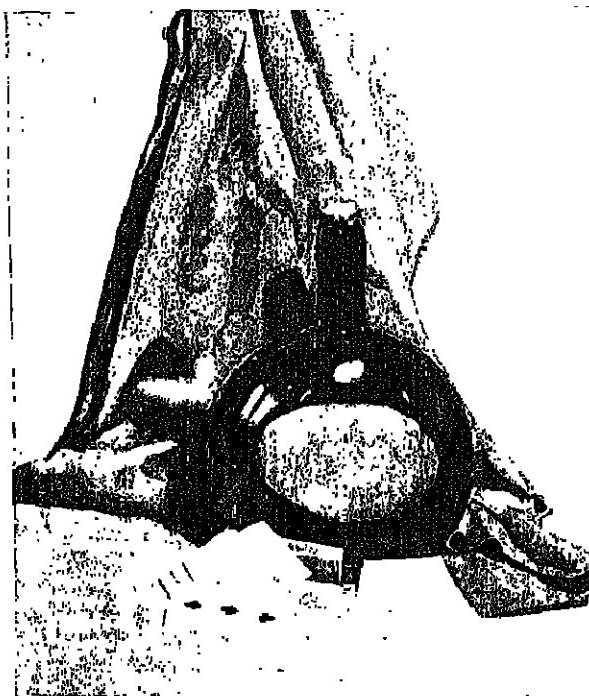


PLATE CXIV. FULL WATER-COLOUR DRAWING OF OBJECTS

of all in normal colouring but a little too high in intensity. A final wash of blue-green (Prussian blue) is floated over the whole painting after it has thoroughly dried, the lights of windows, etc., being wiped out immediately afterwards. The effect of moonlight is achieved by the pervading blue-green tint through which the normal daylight colourings appear to glow slightly.

It is often necessary in school to teach this kind of work by artificial light. In that case it should be remembered that the effect of such lighting is to make the blues and violets appear to be greyer and more subdued than they would in ordinary daylight conditions. Electric light in particular has the same effect as would be apparent by the admixture of a little yellow to the pigments.

and therefore some allowance should be made for this characteristic in mixing up the colder colours, and the purples.

The final lessons in object drawing in colour should aim at the representation of colour influence and the reflection of hues as these are seen in the group of objects. An intensely hued object such as an orange in a strong overhead light will affect the colour of an adjacent object of a different hue, both by its juxtaposition and by actual reflected light and colour. By reason of its position it appears to influence the adjacent hue towards the complementary of the latter, whilst the reflection of its light will actually affect the hue of the adjacent object. Changes of this nature are most obvious when they occur in glassware which is placed in close contact with fruit, flowers or strongly patterned materials and fabrics, and the greatest concentration is needed on the part of the children if they are to observe these effects and to portray them successfully.

If lack of time or any other reason precludes the possibility of reaching a satisfac-

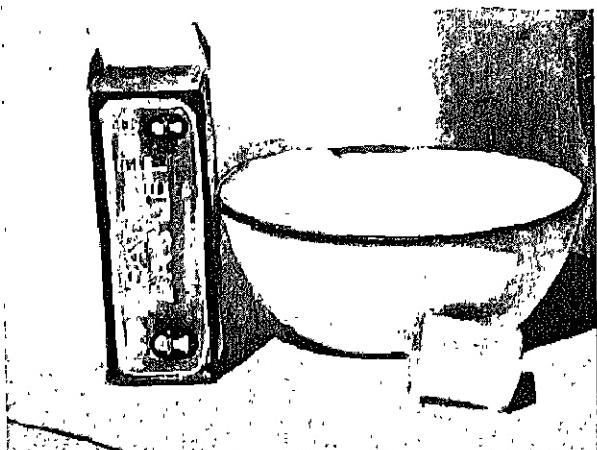


PLATE CXV. WATER-COLOUR DRAWING OF OBJECTS GIVING THE IMPRESSION OF STRONG LIGHTING. THE WASHES ARE CLEAN AND FREELY HANDLED

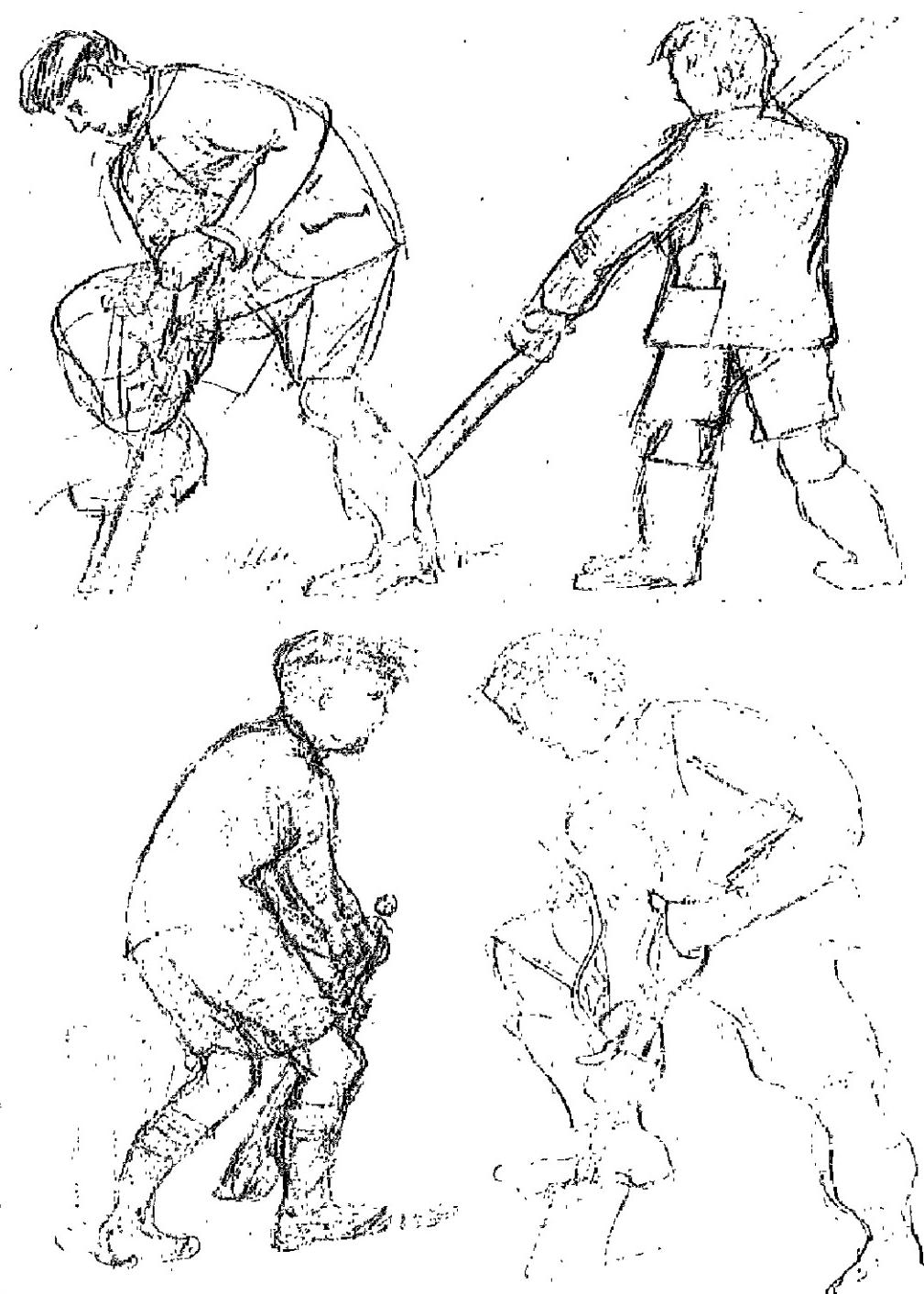


PLATE CXVI. PENCIL SKETCHES FROM LIFE



PLATE CXVII. DIRECT FIGURE SKETCHING WITH THE BRUSH



PLATE CXVIII. FIGURE SUBJECTS IN CUT PAPER, BASED UPON PRELIMINARY PENCIL SKETCHES AND USED IN PREPARATION FOR PANEL DESIGNS



PLATE CXIX. CHARCOAL DRAWING FROM LIFE

tory standard in this type of work it is advisable to leave it entirely alone, as a part of the formal teaching. The children's unaided efforts will suffice for the small degree to which it will enter into the illustration work, and some individual guidance may be given as the need arises.

Plate CXIII shows a group of simple objects which has been handled in the manner suggested. Clean washes with stronger tone where necessary and a few strong and telling touches and lines put in with the brush have produced a spirited drawing which has far more artistic value than a laboured, photographic presentation could ever achieve.

Plate CXIV shows clearly the effect of unity that is gained by carrying the preliminary washes throughout the whole of the painting, enabling the outline of the bottle to be shown sharply clear-cut in places whereas in other places it merges into the

surrounding tones. The bottle shows also the effect of washing down in both the quality of the reflected lights and the soft greyness of the label, which is simply the original background wash slightly qualified by the darker hue of the bottle having been floated across it in the washing down process.

One other important point is demonstrated in this example. Children invariably represent drapery forms by curved lines, so that the forms lose their definite shape which has such strong pictorial value. Drapery folds, and the angles between them, should be represented by straight lines and painted as such. The smooth, thin materials with a dressed surface will be found to fall naturally into long straight lines and sharp angles.



PLATE CX. CHARCOAL DRAWING FROM LIFE

These folds throw sharply defined shadows with clean straight edges, and the actual painting processes will soften these just enough to obtain the suggestion of texture which is the test of a good painting. The example shown in Plate CXIV and the similar instance in Class Picture No. 136 show these points very clearly.

The group of common objects shown in the painting on Plate CXV is remarkable for the effect of strong light in which it appears to be bathed. This is due to the correctness of the tone values of the various shades and cast shadows which occur in the group. A pale, broken colour wash formed the basis upon which the rest of the painting was built up, and the lighted surface of the basin was left almost white paper. In the painting itself the colours are very warm and cheerful, the painting being fresh and directly handled with confidence so that the colour is unspoiled.

FIGURE SKETCHING

The same system of rapid figure sketching is followed throughout the third year. Various media are used and the aim is to catch the spirit of a particular pose in a few lines, to obtain the effect by the use of varied line strength and to train the children to observe at a glance the essential line and form as distinct from the accessories of detail. The drawings are applied to designs for panels and figure compositions.

Plate CXVI shows a series of pencil sketches which are full of life and vigour. They are the result of encouragement in this form of sketching from the beginning of the course. The benefit of this work is to be seen in the improved quality of the classroom illustrations.

Another valuable form of training is

shown in Plate CXVII in which the figures are sketched in directly with the brush. This type of sketch gives increased confidence as each stroke of the brush must be made with decision and with a definite "feeling" for the direction and quality of the line to be drawn.

Even at this stage the coloured papers



PLATE CXXI. SOFT PENCIL AND WASH DRAWING FROM LIFE

are most useful, and Plate CXVIII shows a group of decoratively treated figure subjects carried out in cut paper. This is one step towards the tempera panel in which elaborate detail is not required. The silhouette figures are based upon previous sketches in pencil.

Charcoal is probably the most valuable medium of all for figure sketching, although

it is a difficult medium to use correctly. It has a pleasant softness and suggestiveness which is a snare for the beginner but which is the special advantage of the medium when it is properly used. The two drawings in Plates CXIX and CXX are very good attempts which are drawn from life, and if the

charcoal, whilst the grey tone of the paper is left untouched to serve for the half tones of the subject.

Figure drawing of the formal type which is based upon the study of anatomy and the antique is outside the scope of the senior school altogether, but the children may derive much help and added interest from the study of reproductions of good drawings by the acknowledged masters of the subject. A number of these reproductions are to be obtained from the Victoria and Albert Museum, London, S.W.7, prominent among which are drawings by Alfred Stephens. These drawings were done mainly in red Conte chalk, and they show the use of the parallel line method of shading and the use of curved lines to suggest both form, modelling and foreshortening.

Another method which gives good training in quick figure sketching is shown in Plate CXXI. The drawing is done in firm pencil line, after which washes of colour are carried over parts of the drawing. This line and wash method is useful for quick representation in cartoon work for larger panels, etc.

An attractive form of application of the figure drawing is the study of historical or national costume, and Plates CXXII and CXXIII show examples of work carried out in water colour which are both useful and decorative. A series of these drawings done on Imperial size sheets is of great use to the classes in dress design, needlework and embroidery, as the scale of the drawings allows of the representation of a fair amount of detail. The other main application of this branch of the work is to poster design, Plate CXXIV.

When it is possible to carry on the work of the senior school in the form of evening classes in art, the figure drawing may be extended to include full drawing and paint-



PLATE CXXII. COSTUME DRAWING IN WATER COLOUR

technique is not all that might be desired the drawings have character and life.

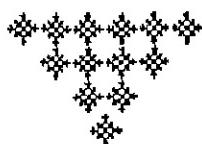
Particularly good effects may be obtained very rapidly by the use of charcoal on a grey paper. The lights of the subject are put in with red or white chalk, in a restrained manner; the darks are represented by the



PLATE CXXIII. COSTUME DRAWING IN WATER COLOUR

ing from the model. In many schools sketch clubs and classes have been formed along these lines, for which models are easily obtained in various costumes and in which serious work of a high standard has been achieved.

Self-expression may cease when the child leaves school, in many cases, but in others the art course lays the foundation of a life-long appreciation which accompanies expression of a high order.



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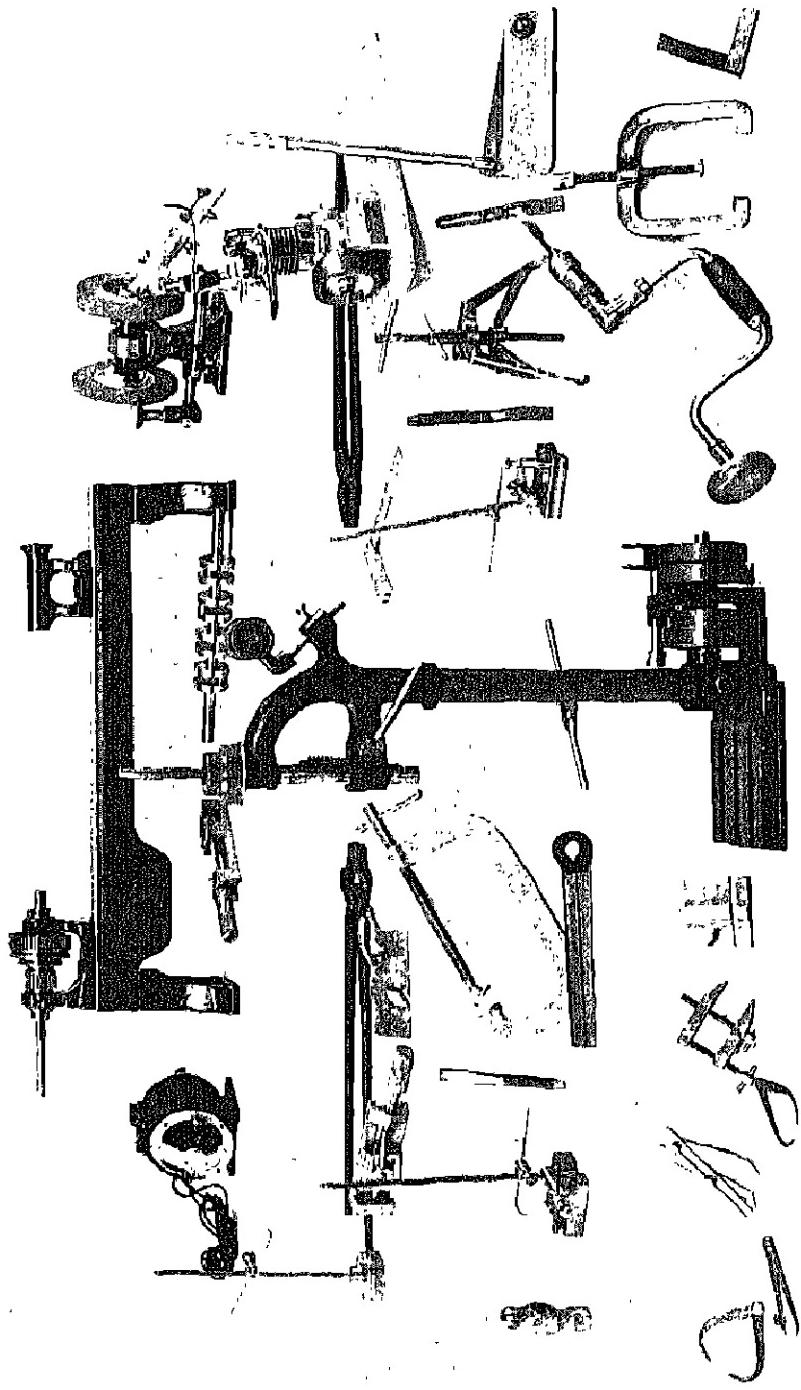


SENIOR WORK—GIRLS



PLATE CXXIV.
COSTUME DRAWINGS USED
AS POSTER DESIGNS

ART AND CRAFTS
ENGINEERING METALWORK



SOME EXAMPLES OF ADVANCED WORK IN FORMAL AND ENGINEERING METALWORK

Of the work shown, the following are of particular interest:

Top row, left to right:—Electric Motor; Small Lathe; Grinding Machine; also a particularly fine example of turned work—A Four Throw, Solid Turner, Crankshaft.
Second row:—Small Machine Vice; Adjustable Shoulder Plates; Two Stroke Petrol Engine; also two examples of Forged Smith's Tonges.
Third row:—Miscellaneous Tools, including two types of SURFACE GAUGE.
Bottom row, centre:—Small Drilling Machine; RATCHET BRACE.

All the examples shown were made entirely from stock materials and castings, and are the work of students during training as handicraft teachers.

INTRODUCTION

IN considering formal and engineering metalwork as separate from art or decorative metalwork, it should be recognised that the two subjects are, to a large extent, integral parts of the subject of metal-work as a whole. There is no clearly defined line of demarcation—they overlap to some extent.

As a broad indication of the scope of this article, however, it may be understood that it will be confined largely to work carried out in iron and steel, rather than metals such as copper and brass. These metals will have some place in the work shown and some information will be given regarding them, but that type of work which may be broadly classified under the heading of hammered and raised hollow-ware generally is dealt with in a separate article.

In the opinion of the writer, it is desirable for the two classes of metalwork to be undertaken in the Senior School—they should be carried on side by side. The preliminary work in metal should consist of exercises in both formal and art work, with the result that after a while the pupils will divide themselves naturally into two main groups; the first containing boys showing a marked flair for one, and the second containing boys with a flair for the other. Some boys do show a marked preference and ability for one or the other, while, on the other hand, some do well in either group and may be permitted to alternate between the two classes of work.

There is, however, a serious danger here—good results can be obtained in either section of the work only if the teacher is really master of the craft. It so often happens that a good teacher of formal metalwork has no knowledge or skill in art metalwork, but, in spite of this, is tempted to dabble in the subject, with the result that the teaching is bad and the work produced of a very

low standard. This operates, of course, in the other direction—the good teacher of decorative metalwork often has no skill in formal work. The teacher of metalwork should make it his business to become the master of his craft before experimenting on human material.

Metalwork can be done by boys of average ability in the modern senior school showing a remarkable degree of skill and accuracy, as will be seen from photographs accompanying this article. In order to obtain these good results, the teacher must be keenly enthusiastic and inspiring to his classes. It would be difficult to imagine a more soul-destroying occupation for a small boy than that of filing away at a piece of hard metal hour after hour with a worn out file, the teacher meanwhile paying no attention whatever to his interests—indeed, as is sometimes the case, not knowing even what the boy is doing.

In the hands of a thoughtless and uninspiring teacher, metalwork must fail; everything depends upon the way in which the work is presented to the boy.

On the other hand, there are schools where the boys live for their metalwork, they attack the hard-resisting material with knowledge and skill, having been taught correct methods of dealing with it; they take keen delight in mastering it and in producing a mirrorlike flat surface. A flat, true surface can mean as much to them as the finished article, and when such a stage is reached the work is well on its way to success. Boys can be taught to find great pleasure in this type of work, and under such conditions excellent work it can become, bringing out in boys that tenacity of purpose so necessary for success in life.

Enough has been said to show that the inclusion of formal and engineering metal-

work is justifiable in the modern senior school, perhaps more particularly in an industrial area with a traditional metalworking background; but, when developed on right lines,

its inclusion in the curriculum of most schools is perfectly reasonable—it is one of our traditional crafts, upon which the life of the nation has been built.

EQUIPMENT

STANDARD FITTINGS, ETC.

In this section, the basic equipment is dealt with; that is to say, machinery and furniture, etc., which is fitted as part and parcel of the fabric of the school. This may, of course, vary slightly to suit the particular requirements of the individual case. The following, however, may be regarded as a good all-round standard.

Makers' names are not stated, as there are many who can supply, but the approxi-

mate prices at which the various machines, etc., can be obtained at the present time are given. It should be remembered that prices vary from time to time, and those shown are intended only as a guide.

The disposition in the room of the various features is shown on the accompanying plan, Fig. 1. This plan shows a room 38 ft. long and 24 ft. wide, and this is a suitable size for the purpose of teaching all types of metal-work. There is also provided a suitably fitted store room, further details of which will be given later.

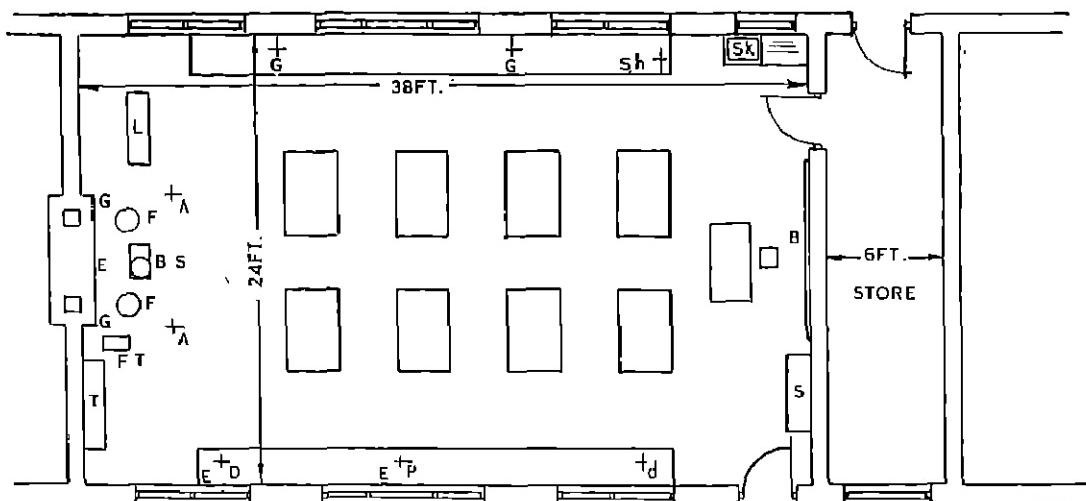


FIG. 1
PLAN OF WORKSHOP

- | | |
|----------------------------------|----------------------------------|
| A. Anvil. | G. Gas points. |
| B. Brazing stand. | H. Lathe. |
| C. Drilling machine. | I. Polisher and grinder. |
| D. Drilling machine (hand). | J. Show cupboard (glazed doors). |
| E. Electric points (power). | K. Shears. |
| F. Forges. | L. Sink. |
| G. Gas points. | M. Tool cupboard. |
| H. Lathe. | N. Work bench. |
| I. Polisher and grinder. | O. Work bench. |
| J. Show cupboard (glazed doors). | P. Work bench. |
| K. Shears. | Q. Work bench. |
| L. Sink. | R. Work bench. |
| M. Tool cupboard. | S. Work bench. |
| N. Work bench. | T. Work bench. |
| O. Work bench. | |
| P. Work bench. | |
| Q. Work bench. | |
| R. Work bench. | |
| S. Work bench. | |
| T. Work bench. | |

Benches.—The position of these is shown on the plan, and detail drawings of a good type of bench are shown in Fig. 2. It is necessary to provide eight of these, four of which should be fitted with three vices each, while the other four need only two each. The usual number of boys per class is twenty, and this arrangement of vices allows for each boy to have a bench place, but with

All the machinery suggested is of the self-contained type. This is better for school purposes than running them from a line shaft, although rather more expensive to install.

Some of the arguments in favour of each machine having its own motor are as follows:—The noise is very much less, as only such machinery as is necessary at the moment

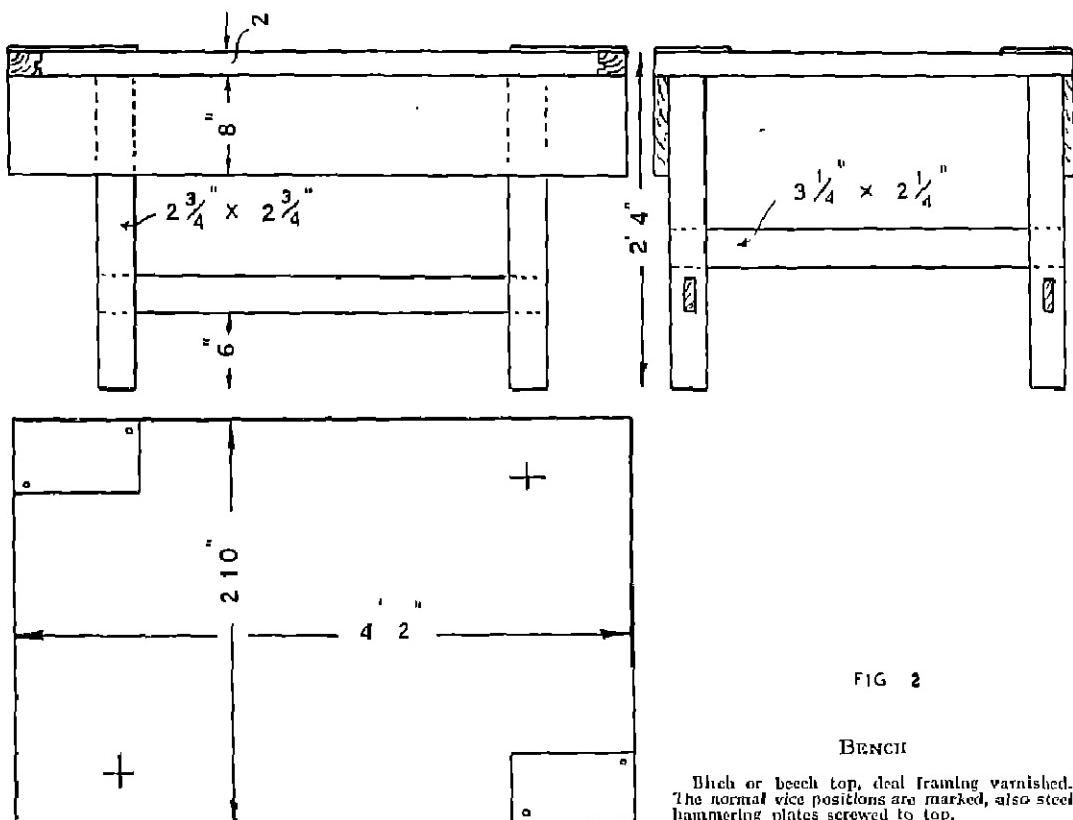


FIG. 2

BENCH

Beech or beech top, deal framing varnished. The normal vice positions are marked, also steel hammering plates screwed to top.

the other activities usual in metalwork at many times several of these places will be vacant.

The bench described can be bought complete with two $3\frac{1}{2}$ in. engineers' type vices for £4 4s. od. Four extra vices will be required and these might with advantage be larger—4 in. will do—and cost about 14s. each.

need be run, thus effecting a saving of electric current consumed. The machine is directly under the control of the operator and the untidy factorylike appearance of the line shaft is avoided.

Drilling Machines.—Two are provided, one being electrically driven and one operated by hand power. Boys should be taught to

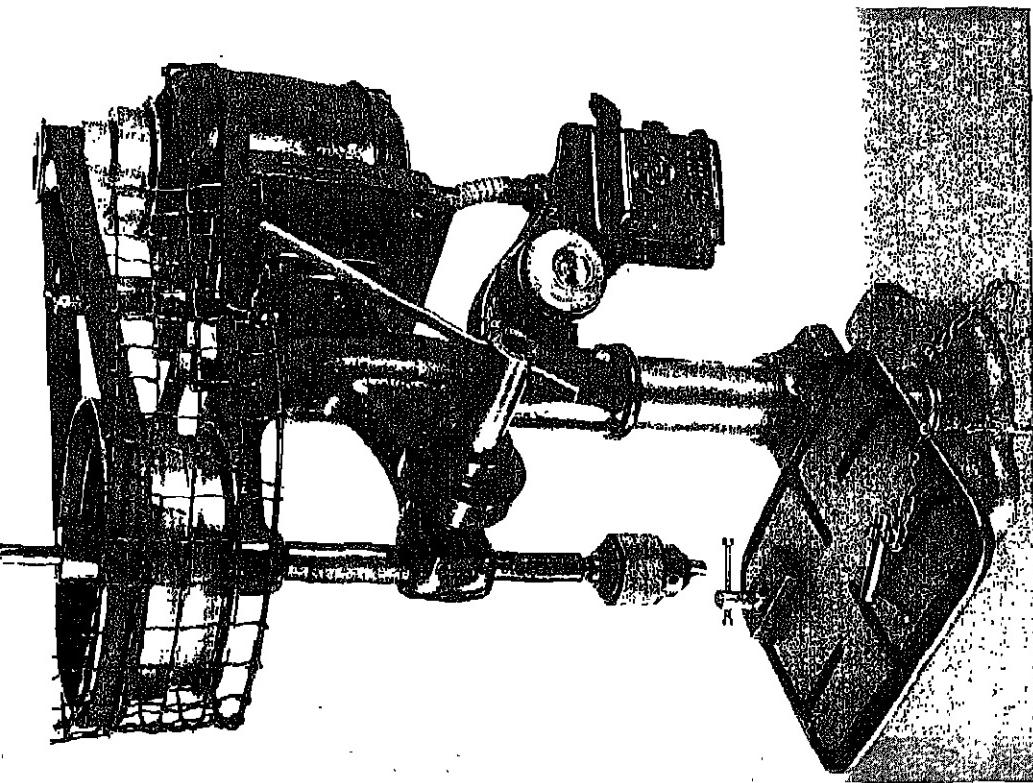


FIG. 3A. POWER DRILLING MACHINE—THREE-SPEED SELF-CONTAINED MACHINE
Note the wire guard fitted after purchase.

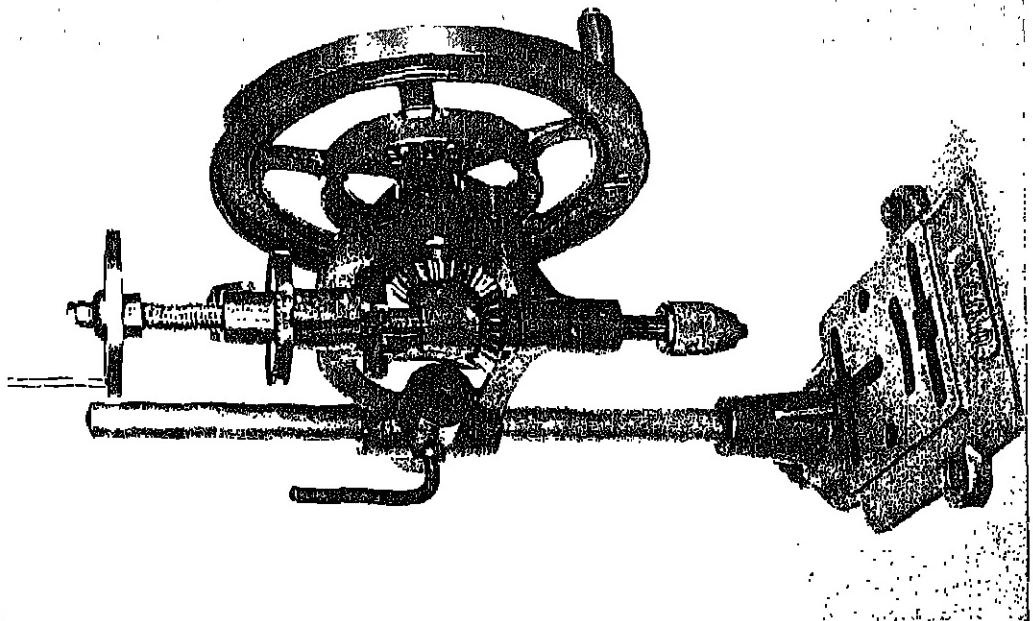


FIG. 3B. HAND DRILLING MACHINE
Two-speed, with automatic or hand feed.

drill on the hand-driven machine first, both from the point of safety and also because it helps them to appreciate the value of sharp drills.

The electric machine should not be of the single-speed type, as this has been found most unsatisfactory for school purposes, where holes of a variety of sizes have to be drilled.

Forges.—Rivet forges with pans about 20 in. in diameter are suitable. Two of these are shown on the plan, but in some cases one only may be found sufficient.

In the sides of the pans small traps are placed which may be hinged out of the way so that long material may be worked. The provisions here made are for two, the air blast being produced by an electrically driven

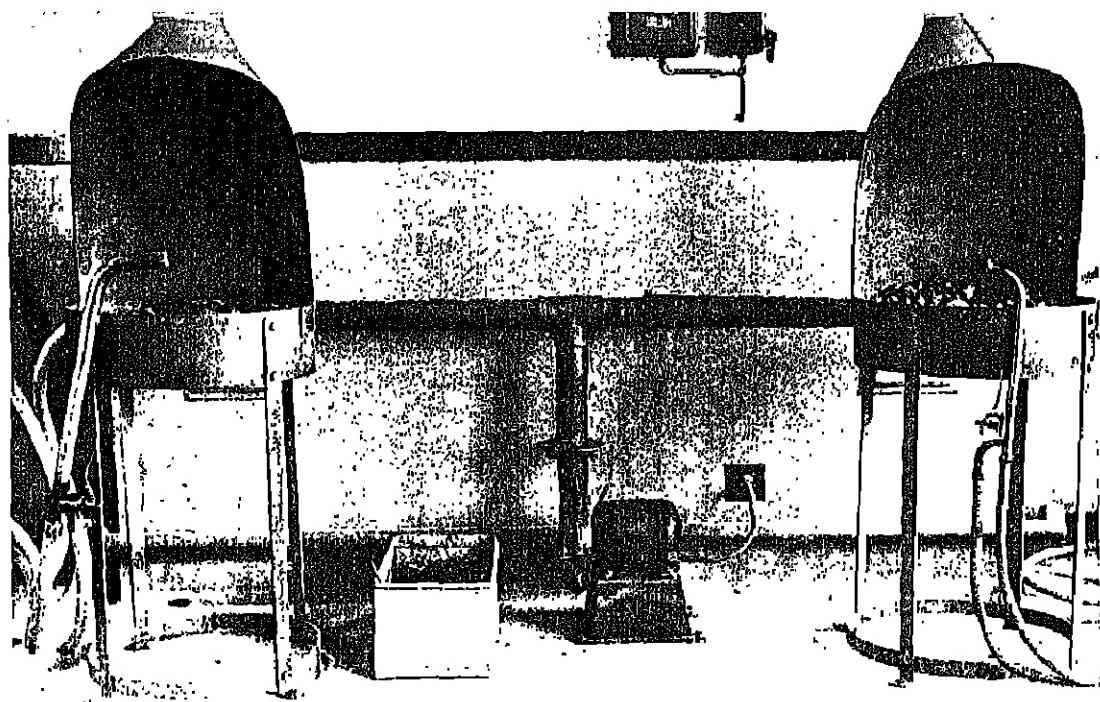


FIG. 4. FORGE AND BLOW PIPE SYSTEM
Air supply obtained from motorised fan.

A suitable machine—with three-speed stepped cone pulleys—is available, and can be obtained either for fitting on a bench top as shown in the plan or as a pillar machine for floor fixing. The price of the bench machine is £15, Fig. 3a.

The hand machine should be a two-speed type and the price about £2 5s. od., Fig. 3b.

fan which also supplies the blast for one or more blow pipes.

By a system of two-way cocks, any or all combinations of forges or blow pipes may be used or put out of action at will.

A photograph of this system is given in Fig. 4, and the installation can be carried out at an inclusive cost for apparatus and fixing of £29.

Brazing stand.—Particulars of this are given in the drawings shown in Fig. 5, and this can be made in the school workshop after the work has begun.

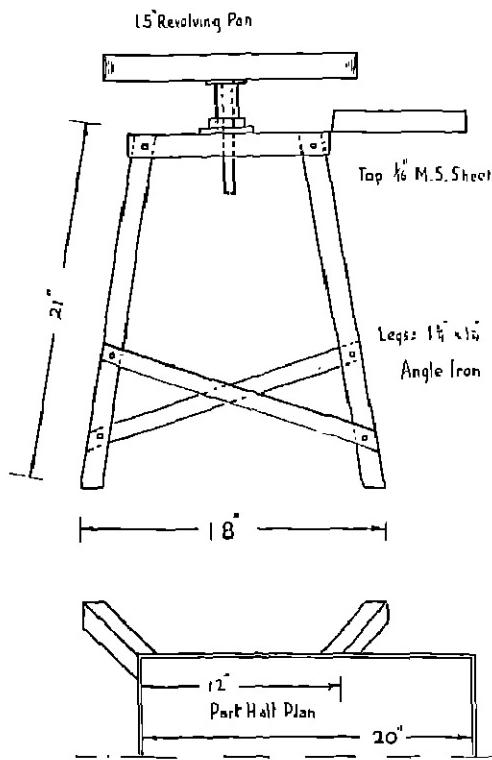


FIG. 5. BRAZING STAND

Constructional details; the socket in which the stem of the revolving pan rotates may be constructed from pipe flanges.

Lathe.—Several suitable machines are available but should be of the back geared, screw-cutting type. A good general purpose, medium priced lathe, illustrated in Fig. 6, costs about £29.

Grinding and polishing machine.—This is a dual purpose machine, principally designed as a grinder but which, by the addition of a small fitting, may be converted into a polisher. It is suggested that one such fitting be obtained and fitted permanently to one end of the spindle, the other end being left

as a grinder. This will be found to be a suitable arrangement for school use. The cost is £10 15s. od. with fitting.

Illustrations of the machine and fittings are given in Fig. 7.

Shearing machine.—This is fitted on the end of the long bench shown on the plan nearest to the store room, and should be at least a 6 in. machine. The cost is £2.

Other fittings.—Among other useful fittings not already mentioned are the following, which might be easily made in the school:

A low bench about 2 ft. high, substantially made with a thick top in which are fixed several sockets of a size suitable to take the various stakes that will be used.

A stand for forge tools consisting of a strong table about 2 ft. 3 in. high, top about 16 in. by 13 in., in which holes are provided to take shafts of tools; a rack may be fitted on one or more sides to contain tongs, etc. Particulars of forge tools follow.

The remaining furniture other than actual fixtures, cupboards, etc., consist of a chair and table for the use of the teacher, and the cost is about £2 10s. od.

It will be seen that the total cost of the foregoing is under £100.

The drawings in Fig. 8 show elevations of each of the walls and give a certain amount of information concerning cupboards and wall benches. A general idea only is given, as it is assumed that the provision of these will be in the hands of the contractors for the building. A few general remarks, however, may be found of value.

It is an advantage if any wall benches provided, such as the two long ones shown in the drawings, have cupboards beneath fitted with sliding doors. They should also have very substantial tops covered with stout gauge zinc; this makes for cleanliness.

One of these benches should be fitted with a number of sliding trays, the number to correspond with the number of classes in attendance each week—usually ten. These trays are used to contain the small work

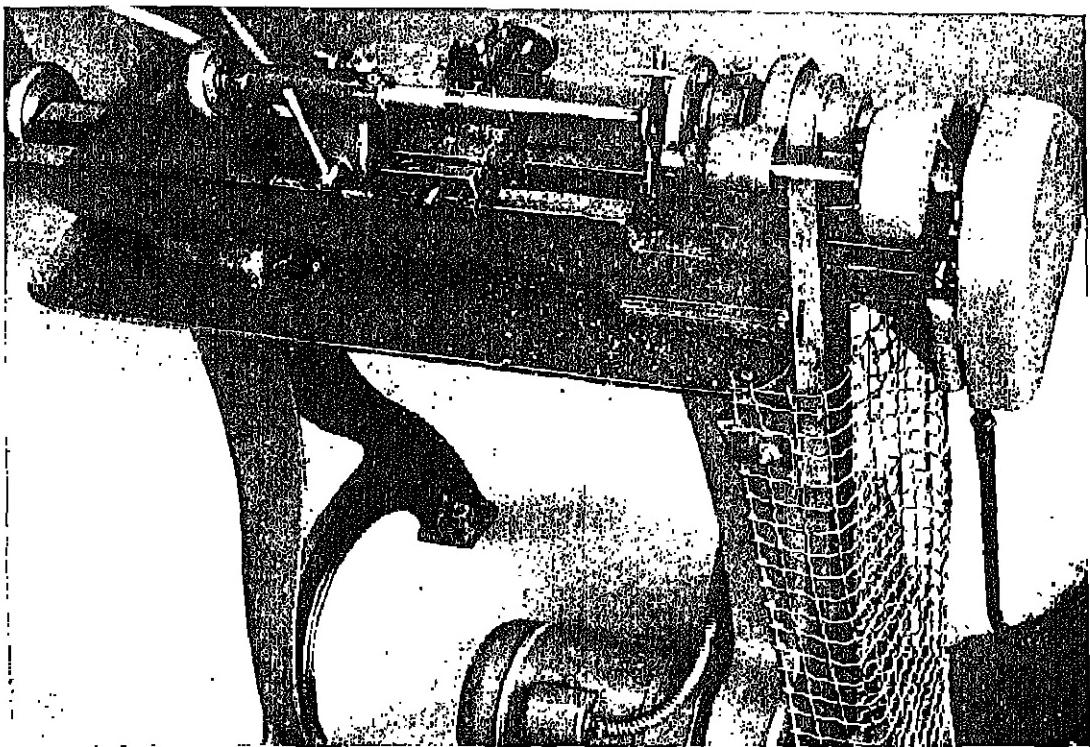


FIG. 6. SELF-CONTAINED SCREW CUTTING LATHE
The lathe is set up for cutting a thread with the work between centres.

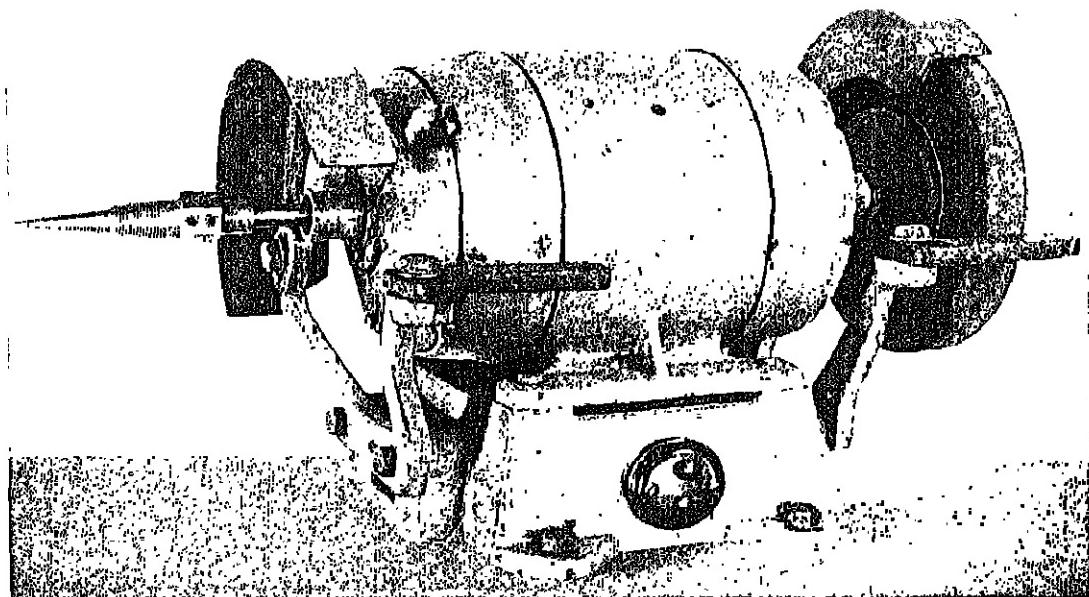


FIG. 7. ELECTRIC GRINDING AND POLISHING MACHINE
Note the removable end on the left hand side. This can be taken off and replaced by flanges and a securing nut to accommodate a grinding wheel, as shown at the right hand end.

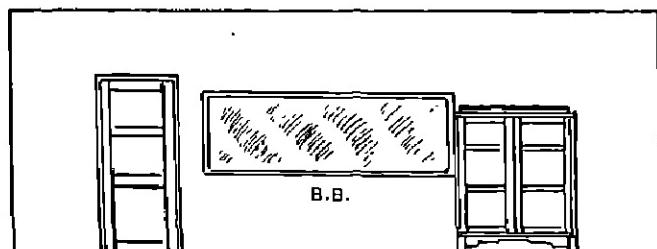
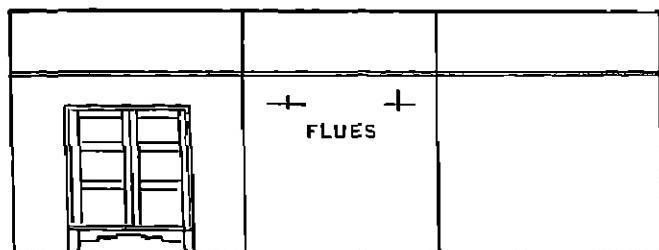
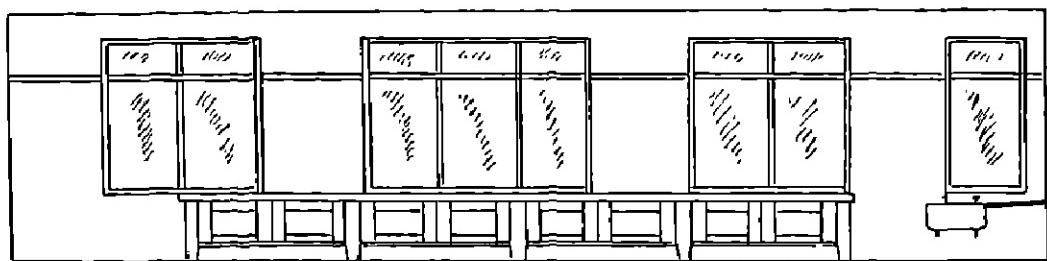
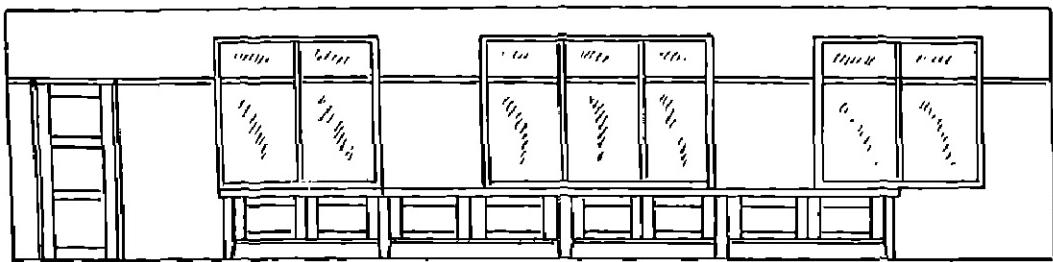


FIG. 8
ELEVATIONS OF WALLS
These show suitable positions for various fixtures.

of the class, the appropriate tray being taken from the cupboard by the monitor appointed, on or before the arrival of the class, and returned to the cupboard when the work of the session is over.

Some space in this same long cupboard will remain available for the storage of individual work too large for the trays.

The cupboards under the other long bench could be used for the storage of miscellaneous stock and for special tools not at the disposal of the boys, except at the teacher's discretion.

Store room.—The store room previously mentioned should be provided to contain metal and materials in bulk, and is a very desirable feature to a well conducted school. A metal storage rack can under no circumstances be made to look tidy, so that it should not be in the workshop itself. This does not mean, however, that the store room should be untidy. Along one side of the store a rack should be fixed consisting of strong timber battens about $\frac{1}{2}$ in. by 3 in., at heights of approximately 2 ft. to 4 ft. and 7 ft. from the floor.

Fitted into these battens at intervals of about 16 in., lengths of stout metal tubes should be provided to project 14 in. Some fairly wide shelves would be useful and also a bin for storing cokes for the forges.

The store should have a window, and a door giving access to the outside of the school and through which delivery of materials may be effected.

These and other of the foregoing points have been only lightly touched upon as so much depends upon individual circumstances, but it is hoped that they may form a useful guide.

TOOLS

The tool equipment will, of course, vary with the work undertaken, but the following list will be of value where a new workshop is being set up; additions may be made from time to time as the necessity arises, and supplementary tools could, of course, be made, good metalworking practice being obtainable from this type of work. As in the case of the standard equipment, approximate prices are given.

Tool	Description	Number	Cost
Anvil	London pattern 100 lb.	2 for	£ s. d.
Brazing Pan	Revolving 15 in.	1	4 3 -
Blow Pipes	$\frac{1}{2}$ in. Lever pattern.	1	1 2 -
" "	" Blo-it-Hot" torch.	1	1 2 -
" "	Tubing for each above.	24 ft.	1 2 -
Block	Elm for anvils, 16 in. dia. \times 12 in. high approx.	2 for	1 - -
Callipers	4 in. inside.	2 @ 8d.	1 4
"	4 in. outside.	2 @ 8d.	1 4
Chopping and Hammering Blocks	Mild steel. 10 in. \times 6 in. \times $\frac{3}{4}$ in.	8 @ 5s. approx.	2 - -
Chisels, cold	$\frac{5}{16}$ in. : $\frac{1}{2}$ in. : $\frac{3}{4}$ in.	3: 1 ea. size	2 -
"	Small special.	3 various shape	1 3
Drills	Jobbers $\frac{1}{16}$ in.; $\frac{3}{32}$ in.; $\frac{5}{32}$ in.; $\frac{3}{16}$ in. $\frac{1}{8}$ in. dia. $\frac{1}{4}$ in. dia.—3: $\frac{9}{32}$ in. dia.—2: $\frac{5}{16}$ in. dia.—2: 2: $\frac{11}{32}$ in. dia.—2.	6 ea. size 12 9	3 6 2 3 2 9

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Tool	Description	Number	Cost
			£ s. d.
Drills—contd.	¾ in. dia.—1: ½ in. dia.—1: 7/16 in. dia.— 1: 15/32 in. dia.—1: 1 in. dia.—1 High Speed, ½ in. dia., 9/16 in. dia. " " 1/4 in. dia., 5/16 in. dia. Some intermediate sizes, in 64ths. " Taper shank, No. 1 Morse taper, ½ in. dia., ¾ in. dia. Slocombe, 1 Sel A-G (7) Circular, aluminium, 1/16 in. to ½ in. by 64ths.	5 3 ea. 1 ea. say, 1 ea. 1 set 2 6 pairs @ 2s. 4d. ea.	3 - 2 6 1 4 5 - 5 - 4 - 3 6 14 -
Drill Stands	Circular, aluminium, 1/16 in. to ½ in. by 64ths.	2	3 6
Dividers Spring	6 in.	6 pairs @ 2s. 4d. ea.	14 -
Drill Chuck	Capacity 0 to ½ in. No. 1 Morse taper (1 for drilling M/c, 1 for lathe).	2 @ 11s. 6d. ea.	1 3 -
Files	Hand, safe edge 10 in. sec. cut. 10 in. bastard. 8 in. dead smooth. Half-round, 10 in. smooth. 6 in. " 4 in. " Flat, 4 in. sec. cut. Round, 10 in. smooth 6 in. " Square, 6 in. 3 square, 6 in. slim taper Mill, blunt, 6 in. sec. cut. Knife, 4 in. smooth. Warding, 4 in. " Needle, assorted 4 in. and 6 in. round, ½-round, flat, 3 square, square, knife. Medium size. Small "	2 doz. 1 " 1 " 1 " 1 " 1 " 1 " 2 only 4 " 4 " 4 " 4 " 4 " 4 " 4 " 2 doz. 6 " 4 " 6 ft. @ 4d. 1 " 2 @ 4s. ea. 1 " 1 " 1 " To take 2 soldering bits with flex tubing and ends. Engineer's ball pane, ½ lb. " " " 1 lb. " " " 1 ½ lb. Sledge, 5 lbs. (all above handled). ¾ in. sq. high speed (or size to suit lathe). Knurling, holder and 6 knurls (to suit lathe). Carriers, ½ in.: 1 in.: 1 ½ in.	1 2 - 10 - 10 - 15 - 4 6 3 6 2 6 2 - 2 2 2 4 2 - 3 3 2 9 3 3 10 - 8 4 2 - 15 6 8 - 3 9 2 8 10 - 13 - 6 3 1 4 1 2 1 10 14 - 6 9 5 -
File Handles			
" " Cleaner			
Gauges	Micrometer, 0-1 in. Surface, 9 in. Wire, Imperial standard " Birmingham "	6 ft. @ 4d. 1 " 2 @ 4s. ea. 1 " 1 " 1 "	2 - 15 6 8 - 3 9 2 8 10 -
Screwcutting			
Gas Heater			
Hammers			
" "			
" "			
Lathe Tools			
" "			
" "			

Tool	Description	Number	Cost		
			£	s.	d.
Lathe Tools— contd.	Chuck, 5 in. self-centring with back plate to suit lathe.		2	10	-
Mallets	Boxwood, 2½ in. diameter.	6 for	6	9	
" "	Raw hide, 2½ in. diameter.	2 for	6	6	
Oil Cans	½ pint, Kay's pattern.	1	1	8	
" "	Joiner's pattern, 2½ in. brass bottom.	2 for	1	3	
Pliers	Combination, 6 in.	2 pairs for	1	6	
" "	Round nosed, 5 in.	2 " "	1	4	
Punches	Centre, American pattern, knurled, 4 in.	1 doz.	2	-	
Polishing Mops	Felt, 4 in. × 1 in.	2 for	4	-	
" "	Calico, 6 in. × 1 in.	2 for	3	-	
" "	Calico, end mop for inside.	2 for	2	-	
Rivet Sets and Snaps	½ in.; ¾ in.; ½ in.	1 ea., 3 for	3	-	
Rules	Rustless steel, Chesterman No. 312d.	2 doz.	1	9	-
Saws	Hack, 10 in. rigid frame.	6 @ 1s. 9d.	10	6	
"	Blades, 10 in., for general use.	1 gross	1	-	
"	Blades, 10 in high speed	2 doz.	4	-	
"	Piercing 5 in. adjustable frame. blades No. 3; No. 5	2	8	-	
Scribers	9 in. knurled pat.	6 " ea.	3	6	
Screwdrivers	1 ea., 8 in. and 6 in.	2 "	9	-	
Soldering Bits	Hatchet, 8 oz.; 12 oz.	2 (1 ea.)	2	2	
" "	Straight, 8 oz.; 12 oz.	2 (1 ea.)	2	-	
Spanner	Adjustable, 8 in.	1	3	5	
Squares	Engineer's, 6 in.	10 @ 2s. 8d.	1	6	8
Steel Plate	For marking out, 12 in. × 12 in. × 1 in., machined all over.	1	1	-	
Stocks, Dies and Taps	½ in. to ½ in. Whitworth standards with tap wrench, Button type	1 set	3	2	-
"	As above but B.S.F. standard, ½ in. to ½ in.		3	2	-
"	As above but B.A. standard, 0-4.		3	8	3
Smith's Tools	Set cold, handled 2 lbs.	1	1	9	
" "	" hot, " "	1	1	9	
" "	Flatter, handled.	1	2	9	
" "	Fullers top and bottom, top handled.	1 pair	3	6	
" "	Hardie, 2 lb.	1	1	2	
" "	Swages, top and bottom, top handled, ½ in.	1	4	3	
" "	Tank, galvanised, 18 in. × 10 in. × 8 in., × 18 gauge.	1	4	-	
Tongs	14 in. closed mouth	2 pairs	9	-	
" "	14 in. open	1	4	6	
" "	14 in. hollow ½ in. sq.	1	2	3	
" "	14 in. " ½ in. rd.	1	2	3	
" "	14 in. " ½ in. rd.	1	2	3	
Tinman's Tools	Anvil, 20 lb.	1	1	6	8
	Bick iron, 20 lb.	1	1	5	-

Tool	Description	Number	Cost
			£ s. d.
Tinman's Tools —contd.	Creasing iron. Hatchet Stake, $5\frac{1}{2}$ lb. (Others as required).	1	15 -
" "	Snips, straight 8 in. " curved 8 in. " straight 12 in.	6 pairs 2 " 1 "	9 - 3 6 2 6
Vices	Engineer's, $4\frac{1}{2}$ in. (as already noted) Drilling machine. Hand.	4 1 1	2 10 - 7 6 1 9

The foregoing should be used as a guide, the work to be undertaken being the deciding factor in ordering tools; most work, however, could be carried out with the tools specified. Tools for decorative metalwork have not been included. With regard to the rather expensive equipment under the heading of Tinman's Tools—Stakes, unless a large amount of work in tinned plate is to be carried out the first four items could be dispensed with.

Simple exercises in tinned plate may be desirable in some cases, and these can be carried out with improvised tools the making of which is within the capacity of some of the better boys.

In the writer's opinion, the work in tinned plate should be reduced to a minimum as, except for the value as exercises, the products are usually lacking in many respects.

MATERIALS AND CONSUMABLE STOCK

The materials required will, of course, be decided by reference to the work to be done and it is a wise procedure to order with the scheme of work in mind.

In order to save unnecessary labour on the part of the teacher in preparation, etc., stock should be ordered in the most suitable sizes. Instead of ordering large sheets of metal from which small pieces have to be cut, involving difficulty and waste, strip metal is to be preferred.

Some sheet metal will, of course, be necessary for the out-of-the-ordinary work which is bound to crop up from time to time. The material known as B.D.S.—bright drawn steel—a mild steel with a fairly good surface and true to shape and size, is a valuable one to use in many cases. The saving in drudgery more than compensates for the higher cost, with the additional advantage that its use brings improvement in the standard of the work done, mainly because it is less laborious in use.

The following list will give some idea of an initial stock and contains most materials necessary; additions may be made as occasion arises:

Bright drawn steel.—Strips and bars at approximately 3d. per lb.
 $\frac{1}{8}$ in. $\times \frac{1}{8}$ in.—10 lb.: $\frac{1}{8}$ in. $\times \frac{3}{8}$ in.—20 lb.:
 $\frac{1}{8}$ in. $\times 1$ in.—10 lb.: $\frac{3}{16}$ in. $\times \frac{1}{8}$ in.—10 lb.:
 $\frac{3}{16}$ in. $\times 1$ in.—10 lb.: $\frac{3}{16}$ in. $\times 1\frac{1}{2}$ in.—10 lb.:
 $\frac{1}{4}$ in. $\times 1$ in.—10 lb.: $\frac{5}{16}$ in. $\times \frac{3}{8}$ in.—20 lb.:
 $\frac{5}{16}$ in. $\times 1$ in.—10 lb.: $\frac{5}{16}$ in. square—10 lb.:
 $\frac{1}{4}$ in. square—10 lb.: $\frac{5}{16}$ in. square—10 lb.:
 $\frac{3}{8}$ in. square—20 lb.: $\frac{1}{2}$ in. square—10 lb.:
 $\frac{1}{2}$ in.: $\frac{1}{8}$ in.; $\frac{5}{16}$ in.; $\frac{3}{8}$ in. round—10 lb. ea.
 $\frac{1}{2}$ in.: $\frac{3}{8}$ in. round—10 lb. ea.

Black mild steel.—The foregoing strips and bars in half quantities, at approximately 2d. per lb.

Tool steel.—Second quality at approximately 6d. per lb.

$\frac{1}{16}$ in. $\times \frac{1}{4}$ in.—10 lb.: $\frac{1}{4}$ in. $\times \frac{3}{4}$ in.—10 lb.
 $\frac{1}{16}$ in. $\times \frac{5}{8}$ in.—5 lb.:

Square section: $\frac{1}{16}$ in.: $\frac{1}{4}$ in.: $\frac{3}{8}$ in.: $\frac{1}{2}$ in.:
 $\frac{3}{8}$ in.: 1 in.—10 lb. ea.

Round section: $\frac{1}{4}$ in.: $\frac{3}{8}$ in.: $\frac{1}{2}$ in.—10 lb. ea.

Tool steel.—First quality at approximately
1s. per lb.

Round section: $\frac{3}{8}$ in.: $\frac{1}{2}$ in.—5 lb. ea.

Octagonal section: $\frac{1}{4}$ in.: $\frac{3}{8}$ in.: $\frac{1}{2}$ in.: $\frac{5}{16}$ in.
10 lb. ea.

Silver steel rods.—At approximately 2s. 6d.
per lb.

$\frac{3}{8}$ in. dia. $\frac{5}{32}$ in.: $\frac{1}{2}$ lb. ea.

$\frac{7}{32}$ in. dia.: $\frac{3}{16}$ in. dia.: 1 lb.

High speed steel.—This is for lathe tools
 $\frac{3}{8}$ in. square section (or to fit lathe tool
holder). 5 lb. at approximately 4s. per lb.

Copper sheet.—16 G. 18 G. 20 G. (semi-hard).
Approximately the same area of each—
40 lb. at 1s.

Brass.—16 G. 18 G. 20 G. (semi-hard).
Approximately the same area of each—
40 lb. at 1s.

Square bar $\frac{1}{2}$ in.: $\frac{3}{8}$ in.: 1 in. mixed—10 lb.
at 1s.

Round bar $\frac{1}{2}$ in.: $\frac{3}{8}$ in.: 1 in. mixed—10 lb.
at 1s.

Copper bar.— $\frac{3}{8}$ in. dia.—12 lb. at 1s.

Copper and brass tubes.—Odd lengths.

Round and square $\frac{1}{2}$ in.: 1 in.: $\frac{3}{8}$ in.:
 $\frac{5}{16}$ in. $\frac{1}{2}$ in.: $\frac{3}{8}$ in.—10 lb. at 1s.

Tinned plate.—6 sheets each 1 xxx and
1 xx—12 sheets for £1.

Aluminium sheet.—8 G. 10 G. 16 G. 20 G.
Mixed—10 lb. lot at 2s.

Aluminium half round section.— $\frac{3}{8}$ in. \times
 $\frac{1}{16}$ in. as used by motor trade for beading—
2 lb. at 2s.

Rivets.

Iron: $\frac{1}{8}$ in.: $\frac{3}{16}$ in.: $\frac{1}{4}$ in. Mixed 2 lb. for 6d.
 Copper: $\frac{1}{8}$ in.: $\frac{3}{16}$ in. Mixed 1 lb. for 2s.

Brass: $\frac{1}{8}$ in.: $\frac{3}{16}$ in. Mixed 1 lb. for 2s.
Aluminium: $\frac{1}{8}$ in.: $\frac{3}{16}$ in. Mixed $\frac{1}{2}$ lb. for
1s. 6d.

Solder.

Soft: 5 lb. at 1s. 3d.

Hard, brass: 1 lb. at 2s. (low melting
point).

Hard, silver: 4 oz. at 1s. 2d. per oz. Hard,
medium and easy.

Iron wire.— $\frac{1}{32}$ in.: $\frac{1}{8}$ in.: $\frac{5}{32}$ in.: $\frac{9}{32}$ in. dia.
—3 lb. ea. at 6d.

Sulphuric acid.—6 lb. at 4d.

Nitric acid.—6 lb. at 6d.

Hydrochloric acid.—6 lb. at 6d.

Granulated zinc.—1 lb. at 10d.

Earthenware bowls.—Glazed for acid—
3 at 2s. (Lids to cover to be made.)

Coke breeze.—Small size (pea and bean)
5 bags at 1s. 3d.

Cotton waste.—1 stone at 6s.

Emery cloth.—oo; o; F; r; $1\frac{1}{2}$; z. 1 quire
each at 2s. 8d.

Whale oil.—1 quart at 2s. 6d.

Machine oil.—1 gallon at 3s.

Soluble oil.—1 quart at 2s.

Kasenit.—1 lb. tin at 2s.

Notes.—It is assumed that such items as
stationery, etc., will be ordered through the
school, but in the case of a centre system
these will have to be allowed for.

The acids should be kept in a safe place
and boys taught the necessary care in
handling them; it may be possible to obtain
these through the science department of
the school. The granulated zinc is for pre-
paring zinc chloride and after the initial
outlay scrap zinc may be obtainable, although
killed spirits made from dirty zinc need
straining.

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The storage of the materials mentioned calls for some remarks. The long lengths of metal should be stored in the racks already described in the section on *Standard Fittings*. Some other small racks, however, should be made, including one consisting of a nest of suitably sized pigeon holes in which cut up pieces of stock sized metal for standard jobs may be kept, so that a boy may be sent to this rack to procure his own material without having to wait for it to be cut. This, of course, is only applicable to work in the early stages where the sizes are fixed. Boys should learn eventually to select and cut their own material.

Some notes on the materials mentioned, including their treatment, may be found useful at this stage.

Bright drawn steel.—This, as already mentioned, is a mild steel, non-hardening, and of good finish, and will be found to be to stated sizes within one-thousandth or two-thousandths of an inch. It is easy to work, bends easily and takes on a fine finish. It should be used where a well finished job is required that does not need to be hardened. It can, however, be case hardened; that is, given a hard surface or case, and the process for carrying out this is described later.

Black mild steel.—This has all the qualities of the foregoing, except its size and finish. The bars and rods are usually found to be rather over size and have a blue or blackish sheen together with a rather rough surface. This should be used for forge work and where a high finish is unnecessary or if the work may be finished by painting. If, however, in the course on forge work, welding is to be attempted, some wrought iron should be obtained as this is easier to weld.

Cast or carbon steel.—When the carbon content of steel is raised above round about .6 per cent., it becomes capable of being hardened. Steel with a .8 or .9 carbon content is a good quality tool steel, capable

of taking a fine temper. The process of hardening and tempering will be described later.

Cast steel bars will be seen to have a smooth shiny surface of a greyish blue colour and, on being dropped, give out a high pitched musical note or ring. The use of this material in the school is confined mainly to tool making.

Silver steel.—This is a carbon steel of good quality specially prepared for easy and convenient working, being carefully annealed and ground on the surface dead true to the specified size—usually sold in lengths of 13 in. This is a very useful material for school but rather expensive.

High speed steel.—This may usually be hardened by cooling quickly in a blast of air or by quenching in oil; no tempering process is required. The temperature to which this steel should be raised for hardening should be higher than for cast steel, almost white hot in fact. Tungsten is one of the important factors in the manufacture of high speed steels and from 16 to 20 per cent. of this and .6 per cent. carbon, together with other constituents such as chromium, molybdenum, etc., give a good quality steel. Cutting tools made from this type of steel may be run at much higher speeds than those of carbon steel without losing their temper; much heavier duties may be put upon them. They are essential for serious lathe work.

Copper.—The copper specified in the materials required is of the type known as semi-hard; the final rolling process in the manufacture of this type of sheet is carried out through rolls with a good surface while the metal is cold. The result is that its surface is smooth and free from pits, marks and other defects. This is an obvious advantage. An important factor in the working of this and other fairly soft materials is that the original good surface should be retained throughout all the processes carried out upon it: it is easier to retain the good

surface than to remove marks and bruises put in through careless working. Precautions should therefore be taken, such as using vice clamps when holding, these clamps to have a smooth surface. Hammer marks and other defects made by rough treatment should be carefully avoided—too much stress cannot be put upon this point. The process of annealing this metal calls for some comment here. As copper is worked it becomes hardened, and if worked too far may crack and split. It should be restored to its soft state by heating in a clear non-oxydising flame to a dull red heat and plunging in water. The surface should be cleaned before proceeding with the work, otherwise the oxide or any foreign matter on the surface may be pressed or hammered in.

Brass.—This is a mixture of copper and zinc with perhaps a little tin, and the notes already given for copper apply to brass, except that the annealing process is better carried out by leaving to cool slowly after heating.

Tinned plate.—This is a thin sheet of iron coated on both sides with tin and having polished surfaces. The terms I xx and I xxx denote thickness and correspond to approximately .016 in. and .018 in. respectively.

Aluminium.—This is a useful material for school work; from it quite a number of useful articles can be made for the home—mainly kitchen utensils. The great disadvantage to its use is the difficulty with which it is soldered, and in spite of patent solders and fluxes the difficulty for the ordinary worker still remains. Where the article requires several pieces, however, they may often be riveted together and the usual folded joints can be used.

Solders.

Soft solder.—This is a mixture of tin and lead in various proportions, one part tin to one part lead giving a good all round solder.

Hard solder.—This may be used in granular form (spelter), or small pieces may be cut from a sheet or, again, a brass wire may be used, the last named being favoured by the writer.

Silver solder.—This is composed of silver, copper and zinc in various proportions.

The only other items that have been mentioned needing some explanation are the soluble oil and Kasenit. The soluble oil is a non-rusting compound soluble in water and used as a cutting lubricant when drilling and turning. Kasenit is a compound put up in a handy tin for case hardening mild steel.

BRIEF EXPLANATIONS OF BASIC OPERATIONS

Filing.—In general, this may be considered one of the most important operations in metalwork—and at the same time one of the most difficult.

It should be regarded as a means of finishing and obtaining accuracy, rather than of reducing bulk. If more than a small amount of metal is to be removed there are usually other means, such as sawing, chisel-

ing or shearing, which should be used with a resultant saving of time and labour and also giving greater tool economy.

Files are expensive and wear out quickly; it is not fair to expect boys to produce good work with worn out files.

The formal teaching of the use of the file should be started on a piece of metal fairly thin, say 16 gauge or about $\frac{1}{16}$ in., so that

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straightness only need at first be dealt with; tests are carried out by comparison with a known straight edge—the edge of a steel rule. A fair degree of accuracy should be expected from the start. The filing of a flat surface will follow later, this being much more difficult. Stance is important, as also is height. The top of the vice should be on a level with the elbow when standing erect, and boards of varying heights should be provided on which small boys may stand.

The feet should be placed in a comfortable standing position, slightly apart, and the file held with the handle in the right hand, the end resting in the hollow of the palm, so that a direct push can be obtained. The thumb should be on the top of the handle, which should not be too large for a boy's hand. While it is not incorrect to point the index finger along the handle, the craftsman usually prefers the thumb on the top and all fingers round the handle. Fatigue and a cramped hand occur more quickly when the forefinger is allowed to point.

The left hand may take up one of two positions, according to the kind of filing being done. If a heavy cut is being made, then the thumb pad or palm of the left hand should press on the end of the file; if, however, light cuts only are being taken, the file end may be held between the thumb and index finger. The filing should be done in a diagonal direction, not at right angles to the vice jaws. On the forward stroke the weight of the shoulders should be introduced, while on the return stroke all weight should be taken off the file; it may, in some cases, even be lifted right off the work. Experience alone can tell the best way, but files cut only on the forward stroke. The most difficult part of filing is to prevent any rocking motion being set up; the file should travel as near as possible along the same horizontal plane, although, in order to allow for this difficulty, so called flat files are made slightly convex in their length.

Suitable files should be selected for the various kinds of work. For a start, a suitable

file to put into a boy's hands would be a 10 in. flat second cut.

Some mention should also be made of a process known as *draw-filing*, a useful means of producing a finish if not abused.

For this process, the file itself is held between the fingers and thumbs of both hands—the handle is not used—and, maintaining a steady pressure with both hands, the file is drawn backwards and forwards along the length of the work. Successive grades of file should be used from coarse to fine to produce a good surface, always bearing in mind the points mentioned previously, reducing the amount of heavy filing to a minimum.

Marking or setting out.—The various pieces of work will need various methods of treatment, but general rules can be laid down. Usually one edge or surface should be made true and this used as a foundation and guide from which all the measurements are taken and all the marking done.

The surface may be prepared to receive the marking in one of two ways. If the surface to be marked is fairly bright and entirely free from grease, a solution of copper sulphate may be applied with a small piece of rag or cotton waste and allowed to dry. This will leave a copper deposit on the surface on which any scribed lines will show up clearly. If, however, the surface is black or covered with scale—and for the work in hand it is unnecessary to remove this—the metal may be heated slightly and covered with a thin brushing of whiting and water to which has been added a little glue-size.

Having made the surface ready to receive the marking, and trued up one edge or surface, lines at right angles to this edge or surface should be marked with the aid of an engineer's square, all lines being struck on the metal with a scriber.

Lines parallel with this surface or edge should be marked by standing the work on a surface plate and marking with a scribing block or surface gauge, see Figs. 9a and 9b.

For school purposes, lines running in any other direction on the work may be scribed with the aid of a straight edge after accurate measurement at two points or with a sliding bevel. In more accurate practice they are put in with the aid of an engineer's protractor, an expensive tool which would not justify its cost for school use.

The setting out of the position of holes

is a very important matter and calls for special mention. After defining the centres with intersecting lines, it is necessary to make a depression in the metal in which the drill can locate itself. Where the hole to be drilled is not greater in diameter than $\frac{1}{16}$ in. and its position not critical, a fairly deep depression may be made at once, with a centre punch, the metal lying on the

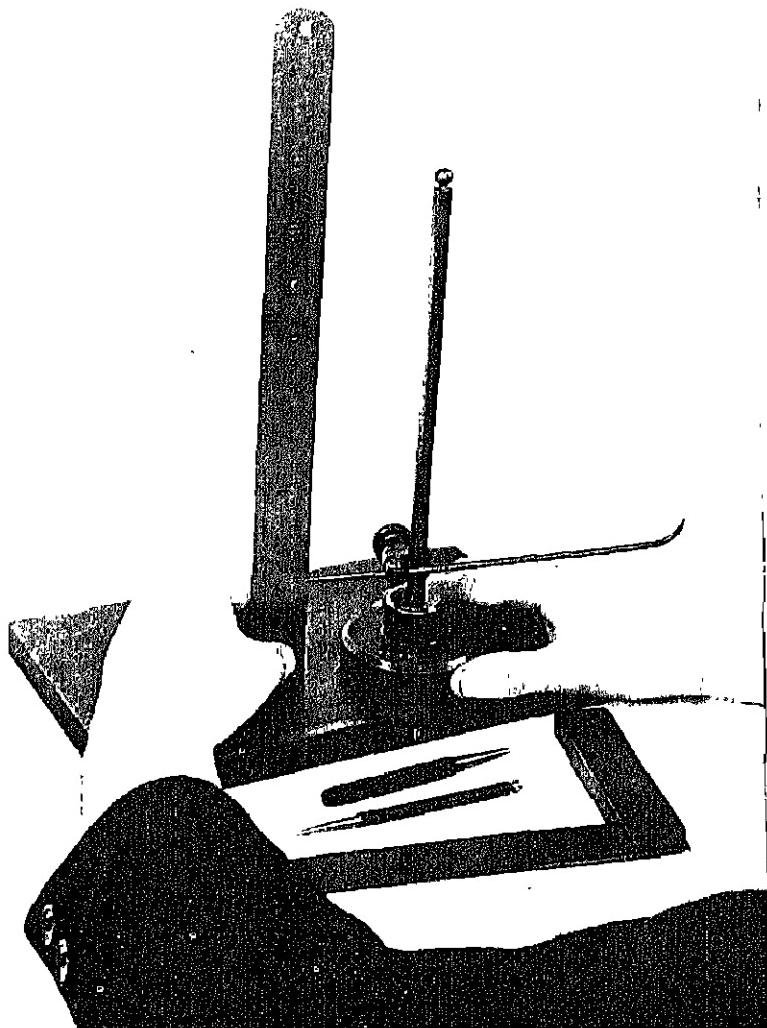


FIG. 9A. MARKING OUT—SETTING THE SCRIBING BLOCK TO THE REQUIRED HEIGHT

Note the other marking tools ready for use.

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hammering block provided on the bench. The surface plate should not on any account be used for this, or indeed receive any rough treatment of any kind. Boys should be taught to respect the surface from the start as all accurate work will depend upon this.

Where holes of a larger diameter than $\frac{1}{8}$ in. have to be drilled and their position is to be accurate, some more particular

marking than that already described should be carried out. First, at the intersection of the lines marking the centres of the holes, make a fine punch dot with a small sharp centre or dotting punch, and with this as centre strike out with spring dividers a circle the same size as the hole to be drilled. Using the same fine punch, mark a few points round the scribed circle; see that these dots are exactly on the line. Finally

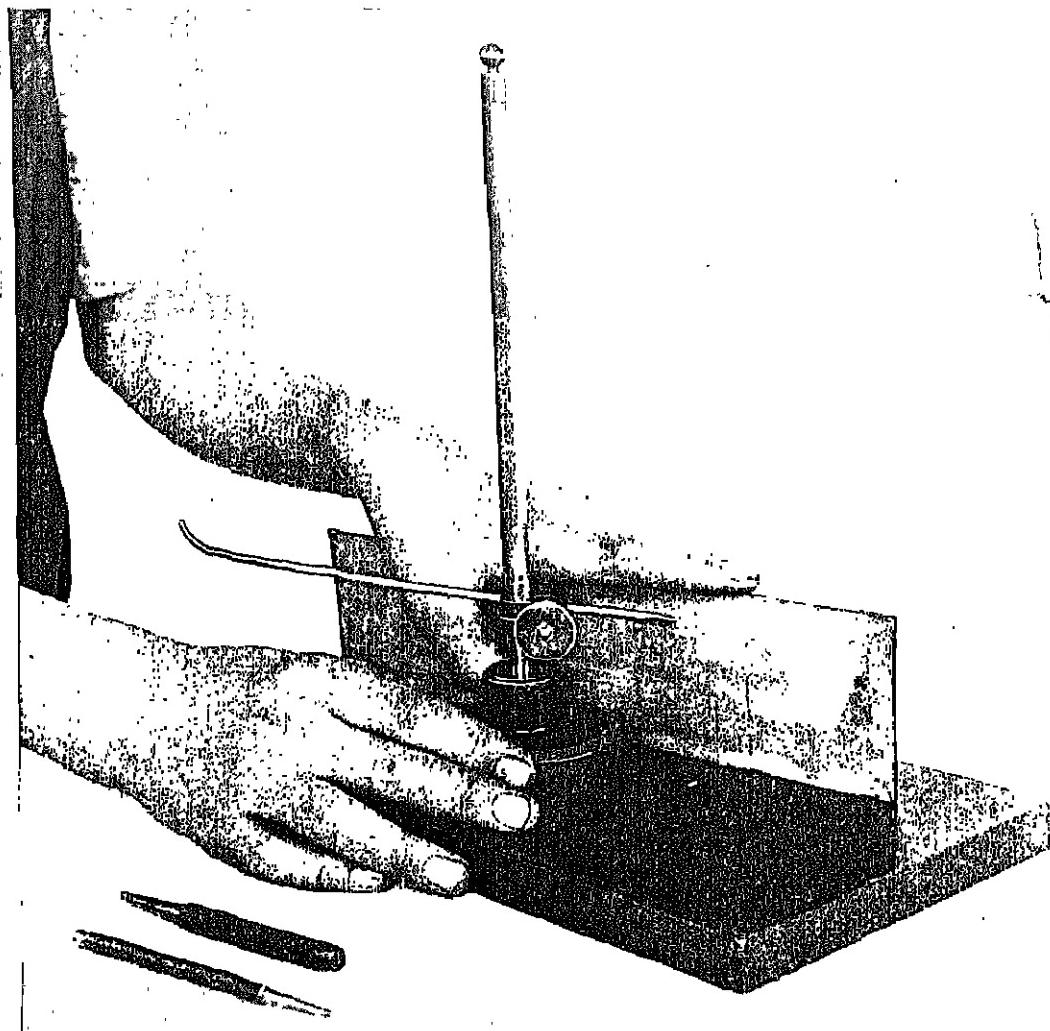


FIG. 9B. MARKING OUT

In scribing the actual line, in the position shown, the scribing block should be drawn towards the worker.

increase the size of the centre depression with a larger centre punch.

The process of drilling is explained later.

It may be valuable in some cases to accentuate some of the other scribed lines in the marking out with a few fine dots in the same way, but all such dots should be very fine and accurately placed dead on the line.

Drilling.—As already mentioned, where the holes to be drilled are relatively unimportant and less than $\frac{1}{8}$ in. in diameter, such as holes for screws, no further precaution or marking other than the centre dot is necessary. The holes may be proceeded with right away.

Where, however, two or more pieces have to be drilled and the spacing of the holes identical, say, for riveting or screwing together, it often happens that one piece only need be marked out and this used as a guide. All the pieces should be secured together in their correct position by means of a hand vice or tool marker's clamp with the marked piece on top and clearly visible. The drilling may then be done right through all pieces at once.

Another method where two or more rivets or screws are to be employed is to drill one hole through the several pieces while secured together and then to rivet or screw together through this hole, finally drilling the other holes.

The marking out of larger holes has been described and the purpose of this is as follows. It does not necessarily follow that a drill will make a hole having its centre exactly in the position originally marked by the centre dot. The following method should be adopted to ensure that the position is accurate:

Bring the drill down slowly on to the metal and allow it to cut a conical depression about half of the finished diameter; now examine this conical hole in relation to the marking out. If it appears exactly concentric, proceed a little further with the drilling, examining for concentricity, until

the full diameter is reached. If this is satisfactory, proceed to drill right through. If at any time during this preliminary process the depression made by the drill is not concentric with the marking, it will be necessary to "pull" the hole. This is done by bringing the drill down until just in contact with the metal and pulling the metal gently in the required direction until satisfactory; care must be taken not to break the drill.

The sharpening of drills needs careful attention and this is dealt with later.

Among other points that may be mentioned in connection with drilling is the fact that it may be necessary to take two bites at a hole, first with a drill smaller than the hole required and then with one of the finished size.

There are two main reasons for this; first it is a way of ensuring that the hole will be accurate in size, as the point of a drill is often the cause of its cutting oversize, or, secondly, the machine may not be capable of removing all the metal at one operation; it may lack the power in the case of large holes.

Soft soldering.—One of the main points to be watched is cleanliness; not only must the metal to be soldered be quite free from dirt, it must also be chemically clean and free from oxide. It should always be remembered that oxide begins to form on any metallic surface immediately upon exposure and in the presence of heat the formation is accelerated. The process of soft soldering is carried out by uniting the two or more surfaces with soft solder. Usually the solder is conveyed to the joint by means of a copper bit, often badly named a soldering iron. In order that the copper bit may pick up the solder its end must be coated with solder; this is spoken of as "tinning the bit" and may be done as follows:

Heat the copper bit in a clear gas flame until nearly red hot and, while still hot, quickly file up the end surfaces of the bit. Now immerse the point into a suitable flux

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and then as quickly as possible rub the end with a stick of solder.

The patent paste fluxes on the market are not very suitable for this purpose; indeed they have very little to recommend them except their convenient form. There are several liquid fluxes on the market which are excellent, however, while the more usual zinc chloride may be made in school and is very satisfactory. Having made the soldering bit ready, the work may proceed.

Probably the easiest material to solder is tinned plate and preliminary work may be carried out in this material. As the surface of this metal is already tinned and mechanically clean, the application of flux should remove the thin film of oxide present. The flux used in soldering performs a three-fold task; it removes the film of oxide, prevents the formation of further oxide by excluding air, and helps the solder to flow.

The heat at which the copper bit is used is important. It should be hot enough to make the solder flow like water but not so hot as to burn away the tinned end. This heat is found only by experience but it must be maintained if a smooth secure joint is to be made; rough, lumpy and dry joints are caused by trying to solder with the bit insufficiently heated.

As a guide to the correct heat, it may be noted that copper gives off in the gas a green flame when at about the correct temperature.

An important point to remember is that the heat to perform the work must actually come from the metal being soldered, so that the temperature and size of the bit must be sufficient to convey enough heat to the work itself to do this. When soldering metals other than tinned plate, it is nearly always necessary to "tin" the surfaces to be joined; by this is meant that each of the surfaces to be joined must be coated with solder and they must be made bright and clean by filing, or with emery cloth, first. A useful means of joining large areas of metal by solder is called sweating, and this is carried out by tinning the two surfaces as already

described and placing them in contact. Heat is then applied to the outside of the joint, either with the copper bit or a blow pipe, bunsen burner, etc. When the solder again melts, pressure should be applied to squeeze out the surplus solder and maintained without movement until the joint is cool and solid.

Brazing and silver soldering.—These two operations are closely allied for, with minor exceptions and a difference in the required temperature, they are the same.

In general, the process of hard soldering consists of the making of joints by introducing a solder consisting of a metal with a lower melting point than that of the materials to be joined. The process is used where greater strength is required than can be obtained by soft soldering and also, where appearances will not permit the use of a white metal joint.

The flux used is borax and serves the same purposes as that used in soft soldering. Common borax may be mixed with water into a stiff paste; it improves the paste if the borax is oven-roasted first. The paste is applied to the joint with a small brush or a spatula. Alternatively, a prepared borax cone may be ground on a slate and formed into a paste.

In silver soldering, the solder is often applied to the joint in small pieces together with the borax paste, and the method of jointing is as follows: The joint must be clean and well fitting, except that some small space usually in the form of a V is left on one side of the work for the solder. The pieces should be wired or clipped together in position, provision being made in the wiring or clipping for the expansion which takes place when heated. This is done by making a series of loops in the wire so that while holding the work firmly it will also give as required. The borax paste and small pieces of solder should now be applied along the joint. The work should now be placed in the brazing pan on a fire brick or packed in position with small pieces of fire brick,

coke or charcoal, and the blow pipe flame played gently upon it. The heat should be applied gradually so that the borax and solder are not blown away by the force of air. After the borax has melted and secured the solder in position, the heat should be increased and intensified by adjusting the flame of the blow pipe until the solder melts; it may be assisted in flowing into and along the joint by running a stiff wire up and down while still in the blow pipe flame. The flame of the blow pipe should always be a clear one and adjusted in position with the work so that the oxidising part of the flame does not make contact with the work; too fierce an air blast should not be used as this also has an oxidising effect. If serious oxidising takes place, the flux will not remove this and a failure may result.

The process of brazing is similar except that the heat required to melt the solder is greater and it is better if the solder is not applied until the temperature of the work has reached the melting point of the solder. In the opinion of the writer, the best form of solder for school purposes is a low melting point brass wire; indeed, it may be of value in silver soldering even to attach a thin strip of silver solder to the end of a thin steel rod by means of binding wire and to use this in the same way as brass wire in brazing. As in soft soldering, the heat for melting the solder should come from the work itself: its temperature must be raised at least slightly above the melting point of the solder being used. In brazing brass, however, care must be taken that the melting point of the solder is below that of the work and it may be necessary to test this with scrap pieces.

Failure in brazing through lack of heat is often caused by neglecting to pack the work round so that heat is held in the job and not dispersed. Each piece of work needs careful consideration. Often it may be necessary to have it lying on a flat surface such as fire brick, other small pieces of fire brick being arranged round it to form a sort of oven with access for the flame and

for working in a convenient place. The work may sometimes be buried in charcoal, coke, fire brick pieces, etc., except for the joint. These and other devices to conserve the heat are often necessary. After hard soldering, it is usually best to allow the work to cool slowly rather than to quench off in water.

When two or more joints are required in the same piece of work, the first should be made with a solder of higher melting point than that used in subsequent joints; thus the first joint may be brazed, the second silver-soldered with "hard" solder, the third with "medium" solder and the fourth with "easy" solder. By this means there is no danger of joints even quite close together breaking away during successive solderings.

Cold bending and twisting.—Many of the so called forging exercises often included in schemes resolve themselves into this class. There is no point in making metal hot to perform operations that can be more conveniently handled cold.

Mild steel up to, say, $\frac{1}{4}$ in. square or round and in strips up to, say, $\frac{1}{8}$ in. by $\frac{1}{8}$ in. or $\frac{1}{2}$ in. by $\frac{3}{16}$ in., as well as fairly wide sheet material up to $\frac{1}{16}$ in. thickness, can be bent cold unless the bends are to be very acute.

It is largely a matter of knowing the material, what it will do and how to do it.

Where twisting is attempted, squares up to $\frac{3}{8}$ in. can be dealt with cold. No set rules can be laid down either for the maximum size or for the methods to be used, but in general it may be said that scheming and method are necessary rather than brute force, while the unnecessary use of the hammer is to be avoided.

One of the most useful methods is the use of a "former," generally in the shape of the bend to be made and in its simplest form a short round bar of suitable diameter. By gripping this in the vice together with the metal to be bent, and pulling or pushing with the hands, the metal may be persuaded to take the shape of the "former."

If more than about a quarter circle is to be formed, two or more vice positions may be necessary, while for square or rectangular bending four operations are performed and in these cases a hammer may have to be judiciously used.

These methods are illustrated in Fig. 10. Twisting square material in the cold is done by gripping the metal in the vice at one extremity of the twist, and at the other a suitably sized tap wrench is secured and a

twist given by turning the wrench, care being taken to keep the alignment of the metal. Tight twisting is not desirable as this gives a tortured appearance; often a quarter revolution is enough but this depends upon the length of the twist. These two methods should be applied with the necessary variations as found desirable, while other similar schemes will present themselves to both teacher and pupil after experience. It may be desirable in some cases to anneal the

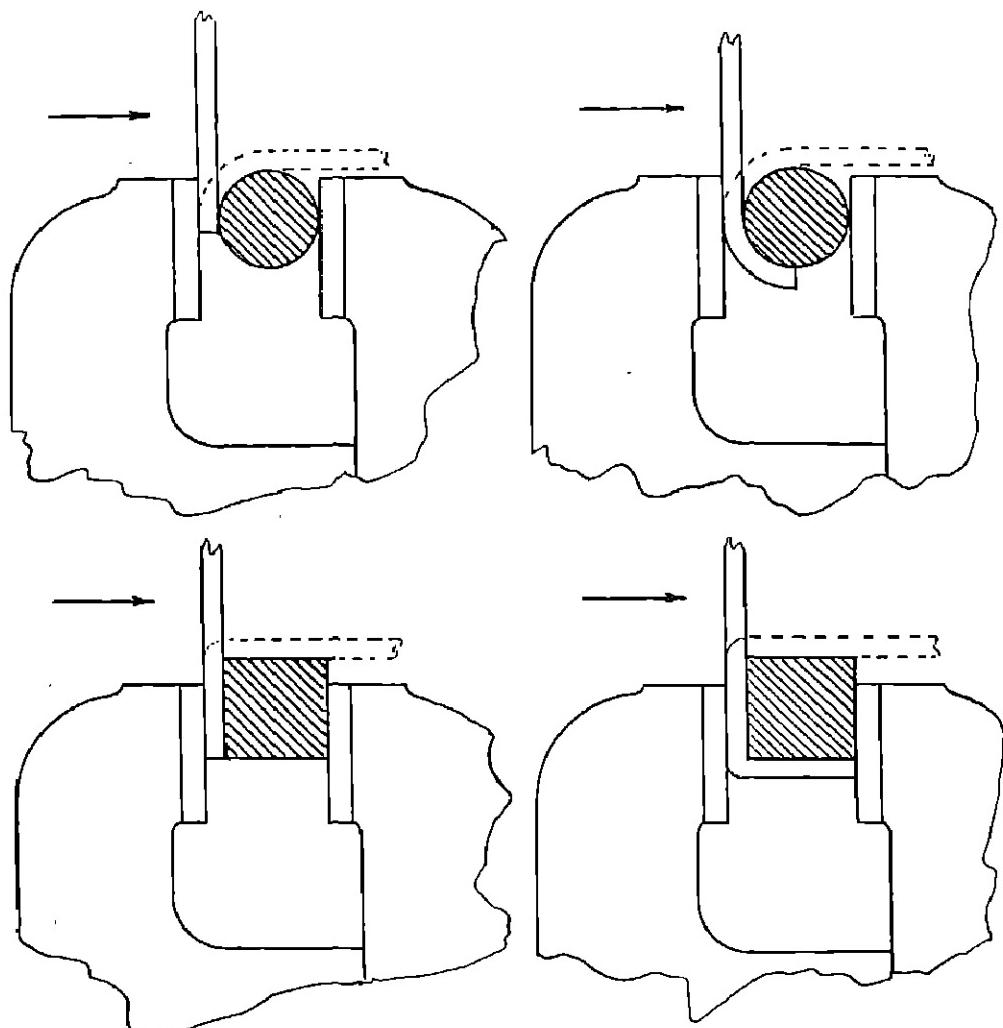


FIG. 10. BENDING ON A FORMER

Square and round formers are shown in use, and the first and second positions are given.

metal after these operations, as strains are set up which may result in the fatigue and rapid breakdown of the work when put into use. The purpose to which the work is to be put and the amount of bending and twisting done are the deciding factors in this.

Forging.—If successful forge work is to be done, the boy must be taught to know exactly what he has to do and how to do it before making his metal hot. It is no use drawing the metal from the fire and then having to decide how the work is to be dealt with. This gives rise to battered and ill treated work being produced. Localised heat and well directed blows with the procedure clear in mind produce good work quickly carried out and with a minimum of heats.

The metal should not be heated more times than necessary as wastage by oxidisation and waste of time occur, together with an increased risk of burning. The fire should be kept bright, hot, clean and free from the clinker which forms at the bottom of the fire from time to time. If allowed to become embedded and hammered into the work, this clinker spoils the surface; it should be removed as necessary without unduly disturbing the fire. The fire should be kept compact and only sufficiently large to do the job in hand. Heat should be localised in all operations by quenching in water, leaving the heat remaining only in those parts which have to be worked. Many simple forge operations call for one or two heats only; for instance, the drawing down of a square tang from either square or round stock not above $\frac{3}{8}$ in. should not require more. No more than two boys should be allowed to work in one forge at the same time, either at a combined job or at individual work. If individual work is being done, they should arrange for one to heat while the other is working. More boys than two per forge is dangerous.

Hardening and tempering.—These processes are important in school metalwork

as they have to be used both in the treatment of tools made in the school and also in the maintenance of the equipment. The type of work usually calling for attention can best be done by point hardening; this method is applicable to all tools, such as scribes, chisels, centre punches, etc., which need part only of their length conditioned, the other parts being left soft.

Take a small centre punch as an example; the tool should be heated for about $1\frac{1}{2}$ in. to 2 in. of its length to a cherry red and quenched, point downwards, in water, leaving some heat still in the upper part of the metal. Withdraw from the water and quickly clean the end bright with either emery cloth or a piece of broken grinding wheel; as the heat travels towards the point, a film of coloured oxide will show on the brightened surface. When the correct colour has reached the end, in this case light brown, the work is again quenched in water, this time right out.

Steel in its fully hardened state is too brittle for most purposes. The process of tempering takes out some of the brittleness, leaving the steel still hard enough to perform the work required.

A table of tempering colours for various tools is given below:

Springs	Full Blue.	570° Fahr.
Screw Drivers	Blue Med.	560° "
Cold Chisels	Purple Med.	520° "
Centre Punches	Brown Med.	485° "
Scribes	Brown Light to Dark Straw.	460° "
Woodworking Tools	from 500° to 520°, Med. Purple to Brown.	

Care must be taken at all time to insert the red hot steel into the quenching bath in such a way as not to crack the metal. If a flat thin steel plate were made red hot and dropped into water on its flat side, it would probably crack or at least become so distorted in shape as to be useless. Methods to prevent this distortion have been devised and are used in special cases, such as clamping a thin steel plate between two heavy

ones. For school purposes, however, this is rarely necessary but care should be taken at all times in inserting hot work into the quenching bath. Generally speaking, tools should be quenched edge or point first and moved rapidly round in the water rather than kept still. The water should never be used quite cold.

A form of tempering different from that already described, and which may be found necessary, is where the whole of a piece of work is to be made uniformly hard; a blade for a shearing machine, for instance. This calls for two separate heats. First the work is hardened by heating to cherry red and quenching right out. It is now dead hard and must be tempered, and this is best done on a hot plate. Any convenient piece of metal is made sufficiently hot so that it will convey the heat necessary to the work to be tempered. The plate should in no case be made red hot. The surfaces of the hardened work are made clean and bright with emery cloth and it is placed on the hot plate, being turned and moved about constantly until a uniform film of oxide of the desired colour is formed; when this occurs the work is again quenched. Some experience is necessary before really satisfactory results are obtained and it is advisable to experiment before undertaking any important piece of work. Boys may be allowed to practise on any piece of scrap metal. Mild steel, while not being capable of hardening by these methods, will show the colour film in the same way as the more expensive cast steel.

It should be noted that for both methods of tempering the surface of the work should be made bright before the *hardening* is done. Wherever a good finish is necessary, this should always be obtained before any heat treatment, for although the heat will take away the brightness it will be comparatively easy to restore this if it was there originally. If, on the other hand, the work is not finished before treatment, it will be impossible to do this afterwards except by grinding.

Case hardening.—By this process a thin case or skin of hardening steel is formed on the outside of pieces of non-hardening iron or steel by the addition of carbon. When formed, this case is hardened in the same way as already described, but no tempering process is required.

For the purpose of the school, no deep study of this process is necessary as, with the limited apparatus available, only a very thin hard skin can be produced. This is often enough for school purposes. The procedure is as follows:

Some material rich in carbon is required and the pieces to be treated are heated to a bright cherry red and allowed to soak in this material, thus absorbing the required carbon. For this purpose several good proprietary compounds are available. A metal box should be made sufficiently large to contain any piece of work likely to require case-hardening and this box should be nearly filled with the hardening compound. The work should be treated as already described and the process may be repeated several times. Finally, the work should be heated and quenched in water.

Grinding.—Having provided for an electric grinding and polishing machine, nothing will excuse the teacher who allows the equipment to fall into the deplorable state so often seen in school workshops. If good work is to be done, every tool and appliance must be maintained in first-class condition. The grinding machine is provided mainly for sharpening tools having hardened cutting edges or surfaces, and it should not be used for removing waste metal. Lathe tools, centre punches, scribes, chisels and drills form the main part of the equipment needing constant attention by grinding. The sharpening of scribes, chisels and centre punches calls for very little comment except that they do need frequent and systematic sharpening. All that is necessary is that they shall be ground to their original angle at the point without being overheated. A small water bath should be provided on the bench

at the side of the machine into which the tool being ground may be dipped repeatedly during sharpening; overheating will soften the tool, making it necessary to re-harden it.

The sharpening of lathe tools and drills is considerably more difficult. Lathe tools when supplied usually conform to certain shapes; these may need some modification to make them suitable for cutting different materials, but they will, if studied while new, form a guide to what is required. The teacher is advised to seek more technical information on this subject than can be given in an article of this kind.

The grinding of twist drills, however, while difficult for the inexperienced can soon be mastered if certain principles are known. There are three common faults often made in grinding twist drills, the first being that the two cutting edges are ground unequal in length; the second, that these cutting edges are ground unequal in angle,

and the third that insufficient or no clearance is given to the cutting edges. The results of these faults are as follows:

In the first case the drill will cut over-size; in the second, only one edge does the cutting with consequent rapid wear and also inaccuracy in size, and in the third the drill rubs at points behind the cutting edge with no real cutting action at all. The lack of clearance makes itself shown when looking directly at the end of the drill by the direction taken by the line of the point, and after a little practice a glance is enough to check this.

It has already been noted that drilling should be first taught on a hand machine, where the importance of correctly sharpened drills is more apparent. An electric machine will force a blunt or badly sharpened drill through metal while the physical effort needed to do this with a hand machine makes itself felt.

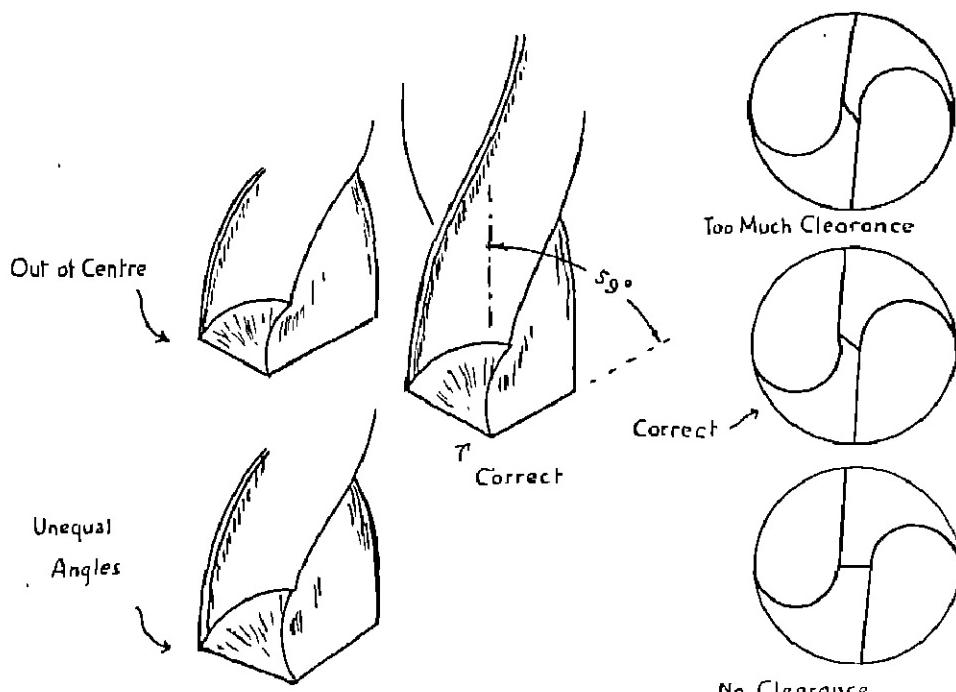


FIG. 11. TWIST DRILLS

The correct angle and appearance of the end are shown, together with some common faults in grinding.

Badly ground drills which are forced through metal soon become useless, and even with care the school life of drills is short.

The diagram given in Fig. 11 show the correct cutting angles and the common faults, and it should be remembered that the two cutting edges must touch the metal simultaneously and before any other part of the drill, except the extreme point, makes contact.

Chiseling and chipping.—The use of the cold chisel in school workshops should be limited if good results are to be obtained. The practice of hacking out irregular shaped pieces of sheet metal by means of a chisel either in the vice or on a chopping block is to be deprecated as a means of removing waste. It is neither quick nor satisfactory and generally much better ways can be found which will give better results with a saving of time. It will be noted that six cold chisels have been provided in the tool equipment, and these may be used if and when a serious need for them arises as it may, say, for cutting a groove or chipping away a blob of hard solder; but as a tool for removing waste it should not be used unless no other tool will do the work better. Accuracy cannot be obtained by boys in this manner and its use leads to sloppy, ill treated and badly finished work.

Riveting.—The process of joining pieces of metal by means of rivets may be divided roughly into two groups; in the first place, where it is permissible for the head of the rivet to stand out on one or both sides, and secondly where projection above the surface is an undesirable feature.

In the first of these two cases, rivets are purchased, and, while they are made with heads of various forms, for school purposes the round headed rivet is usually sufficient.

The holes in the several pieces should be drilled and accurately spaced so that they register in the correct position and also that the rivet to be used is a good fit in the hole; this is important as if the rivets are slack

in the holes bending may easily occur and this should be avoided. Methods for drilling the holes have already been given in the section on drilling. In its simplest form, riveting consists of driving the rivet through the pieces and tapping the protruding end with the ball pane of the hammer to form a neat head similar to the manufactured one at the other end. A better job can be made with a "set" or "doubletool." This is a hardened steel punchlike tool having in its working end a hole the size of the rivet shank and also a cuplike depression the size and shape of the head to be formed. Having passed the rivet through the holes, the set is placed over with the protruding end of the rivet in the set hole and a sharp blow is given to the striking end of the punch with a hammer. This forces the two pieces closely in contact. The cup-shaped depression is next placed over the protruding end of the rivet and the punch is hammered until a round head is formed on the rivet. If the manufactured head is to remain a good shape and not be flattened, it should be supported by another set which is held in the vice; alternatively, it may be placed on a piece of solid copper which will give under the blows, and the head will form its own depression into the comparatively soft surface without being damaged. The amount of rivet shank left protruding is important; if this is too long, bending will occur, while if too short a good head cannot be formed. The correct amount is found by experience and no simple rule can be given to satisfy all conditions, but for small rivets usual in school work one and a half times to twice the diameter of the rivet should be allowed.

In the second type of riveting mentioned above, and where no projecting head can be permitted, the head must be formed below the surface of the metal. Soft iron wire or good quality mild steel may be used for the rivets, and the outside of the hole must be countersunk to form a depression in the metal in which the head is formed. This may be made either with a countersink bit or a larger sized drill, but it should not be

too deep, sufficient only to give the necessary strength, otherwise the end of the wire will crack under the hammer, leaving holes where a completely filled space should present an unbroken surface on the metal after the surplus has been filed away. Enough material must be left more than to fill the depression, again a matter of experience. Where both ends of the rivet are to be countersunk the riveting should proceed gradually, a little from each side in turn until both ends are finished. A well made countersunk riveted joint should be imperceptible except, perhaps, by a slight colour contrast, a faint ring of lighter or darker material.

Tapping and screwing.—Tapping consists of working a screw thread inside a hole, and screwing or forming a thread on a round bar or rod. The usual forms of thread to be cut in schools will be confined to Whitworth Standards or British Standard Fine Threads, with the possible addition of some sizes of British Association Threads. These standards are abbreviated as Whit., B.S.F., and B.A. respectively. The procedure is the same in each case. In forming external threads the procedure is simple. Having secured the correct size stock or rod, or alternatively, the turned part to be screwed, a *die* of the same size is taken and run down the work. With a button type die this may be done in one operation or at the most two. A lead or taper should be turned or filed on the work so that the die can start readily.

The forming of internal threads calls for some other knowledge, however; namely, the *tapping size* of the hole required to give the necessary allowance for the depth of the thread. The hole, of course, must be made smaller than the size of the screw by an amount equal to the double depth of the thread. This size may be found either by calculation or from a table. Such a table for Whit. and B.A. Standards is given below, sizes being given to the nearest sixty-fourth inch, this being accurate enough for most school purposes:

Size	Tapping Size		Threads per In.	
	Whit. B.S.F.	Whit. B.S.F.	Whit. B.S.F.	B.S.F.
$\frac{1}{8}$ in.	$\frac{3}{16}$ in.	—	40	—
$\frac{5}{16}$ in.	$\frac{9}{32}$ in.	—	24	—
$\frac{1}{4}$ in.	$\frac{3}{16}$ in.	$\frac{13}{64}$ in.	20	26
$\frac{9}{16}$ in.	$\frac{15}{64}$ in.	$\frac{3}{8}$ in.	18	22
$\frac{5}{8}$ in.	$\frac{19}{64}$ in.	$\frac{5}{16}$ in.	16	20
$\frac{7}{16}$ in.	$\frac{21}{64}$ in.	$\frac{23}{64}$ in.	14	18
$\frac{3}{4}$ in.	$\frac{25}{64}$ in.	$\frac{27}{64}$ in.	12	16

A formula for finding the tapping size may be stated as follows:

$$\text{Dia.} = \frac{1.2806}{\text{No. of threads per incl}}$$

As B.S.F. has the same form and shape of thread as the Whit. Standard, this formula may be applied in both cases; e.g., to find tapping size for $\frac{3}{4}$ in. Whit. Thread:

$$\text{No. of T.P.I.} = 20 \therefore \frac{1.2806}{20} = \frac{1.2806}{20} = 1.86 \text{ or } \frac{13}{16} \text{ in. nearly.}$$

Having decided upon the tapping size and drilled the hole, the tap is turned into the hole by means of a wrench, care being taken to keep the tap upright in the hole. Three taps go to make up a set; taper, second and plug being used in this order to form a full thread. Taper and plug will often do the work, the second being dispensed with except in special circumstances.

Turned work which has to be screwed can often be done best before removal from the lathe and the process is described under the heading of *turning*. The majority of school threads can be produced by the methods indicated, but threads may also have to be cut in the lathe by an accurate process known as screw-cutting.

Turning.—Early work on the lathe should consist of simple operations only, and of these probably the simplest is the turning down of a short shouldered piece of, say, $\frac{3}{4}$ in. dia. mild steel to a diameter of $\frac{1}{2}$ in. for about $\frac{3}{8}$ in. or $\frac{1}{2}$ in. of its length. For this

process the work should be held in the three jawed self-centring chuck with no more than is absolutely necessary standing out. Work must not be done too close to the chuck or there is a danger in inexperienced hands of the tool, tool holder, slide rest or some part of the lathe carriage fouling the chuck. If on the other hand work is allowed to stand out too far, there is a tendency to bend as well as an unnecessary strain being put on the main spindle or mandrel with consequent too rapid wear of the bearings. The piece of work already mentioned also calls for simple facing. Where longer work is to be carried out, it is necessary to turn between centres. The chuck is removed and replaced by the carrying plate and back centre, and the tail stock is brought up to support the other end. The work is rotated by means of a carrier secured to the head stock end of the work and making contact with the driving pin in the carrying plate. This is all shown quite clearly in Fig. 6.

Special attention is necessary in the preparing of the stock for this operation; a particular type of hole must be made into which the lathe centres are inserted. There must be a perfectly clear, well shaped hole in each end and this is best made by means of a slocombe drill, which consists of a small drill and countersink combined, the countersink being formed at an angle of 60° to conform with the shape of the lathe centre. By this means the actual point of the centre is prevented from wearing away as it is perfectly free in the small hole made. The drilling may be done in two operations if no slocombe bit is available, a small hole being drilled first and then countersunk to an angle of 60° . During the entire turning process by this method, the tailstock centre must be kept well lubricated or burning will take place. A point often disregarded in turning between centres is that as cutting takes place heat is generated in the work, causing expansion; this must be allowed for when starting a cut by feeling the pressure of the centres by rotating the work with the lathe at rest. The cut should be started

with the work quite free but not slack. This tension should be repeatedly checked between cuts as the work proceeds.

For turning mild or cast steel a cutting lubricant is necessary, while brass and cast iron are turned dry. A good all round cutting lubricant is an oil soluble in water as shown in the list of requirements. This may be diluted with water to any desired consistency and will not cause rusting.

The method of cutting screw threads with a die already mentioned, is as follows:

Having turned the work to the required diameter and turned the end taper as a lead for the die, the centre is removed from the tail stock, and the die, in its holder, is placed in the starting position. The hollow tail stock spindle is fed up behind and in contact with the die holder. The lathe is now rotated by hand, pulling slowly on the belt while the tail stock is kept screwed up behind the die as it progresses. The pressure should not be forced, light contact and no more being necessary. The die holder is prevented from revolving by allowing it to rest upon some convenient part of the lathe.

This method will ensure a square start and a more accurate thread than can be obtained by hand with the work in the vice. Other lathe processes will be necessary as the work becomes more advanced and the teacher is advised to seek more technical knowledge on these matters.

Finishing processes.—When a piece of work has the stamp of the craftsman upon it, it may be said to be well finished.

This, in so far as metalwork is concerned, is made up of many small but important points. For instance, no matter how brightly polished a piece of work may be, if the surfaces are not true and flat it cannot be considered as finished. Paint, enamel or the like, used with the idea of covering up bad work, does not constitute finish. These finishes may sometimes be used in a correct manner, but they are so often applied badly and under wrong circumstances, mainly with the idea of saving trouble, that one

looks with suspicion at work so treated. These coating substances should under no circumstances be used where the work is not well finished first.

Work that may be considered well finished should show several distinctive features. The surfaces should be flat and true and grainless; the corners should be sharp and accurate, but not so sharp as to be cutting edges. These very sharp edges should be removed by making a very small chamfer on them, not by rubbing carelessly with emery cloth or any other slapstick method. The best way is to take the work in the left hand and with a dead smooth file make a light diagonal stroke along the edge to be treated. It is a wise rule never to allow the use of emery cloth held in the hand.

Surfaces should be treated with a series of files of successive grades until free from deep scratches; then and only then should the use of emery cloth be allowed. This should be in the form of a strip and held securely on a file, being used in the same way as a file would be used; or it may be glued on to a strip of fairly hard wood and used as an emery stick.

Draw-filing, and "draw-filing" with the file covered with emery cloth are also useful methods if not abused. Emery cloth should not be torn up into small square pieces but into strips conforming to the width of the file in use. It is bad practice to use the file for finishing work in the lathe; this should be *turned* to the size required and only in special circumstances should the file be used.

Forged work should, generally speaking, be left from the hammer and not filed up, but this must not be regarded as a rigid rule. If for any purpose, such as in making some tools, a bright finish is necessary, then the work must, of course, be filed, but filing should not be done to produce shapes or improve shapes that should be forged.

A useful process in the finishing of work carried out in mild steel is heat colouring. This not only gives a distinctive appearance, but acts as a rust preventative. It should be applied only to an already well finished surface.

The bright surface of steel changes colour on heating, passing through a series of browns, purples, blues, etc., until red heat is reached. The film of oxide thus formed denotes roughly the temperature of the metal and this is used to advantage in the tempering of cast steel tools. Mild steel, however, while not being capable of hardening and tempering, does show these colour films and they may be made a more or less permanent feature of suitable work. To do this, any gas flame will serve—burner, gas ring or blow pipe with small flame and little force of air. Take two wads of cotton waste and saturate them with machine oil and hold one in the palm of each hand, much in the manner of a kettle holder. Take the work to be treated in one hand and pass the free end back and forth through the flame, repeatedly wiping with the other oiled pad. Keep the surface smeared with oil rather than allow a thick coat of oil to remain on the surface. With a little experience some beautiful effects can be produced. When a satisfactory result is reached allow the work to cool slowly, wiping occasionally with the oily waste. Very effective bands of light and dark colours are obtainable in this way, but it is best to form some film over the whole of the surface rather than leave parts quite bright; if this is done the bright parts may rust. Much depends on the treatment the article is to receive as to the permanency of the colour. For instance, a paper knife such as those shown in Fig. 15, and constantly handled, may need further treatment in six months, while in a clean atmosphere the base of the inkstand shown in Fig. 25 may retain its original lustre for many years. An occasional wipe over with a smear of oil will refresh the surface.

Decoration by punching.—Throughout the work to be described it will be noted that various points are indicated where this type of decoration may be employed. Good examples of this means of decoration are shown in photographs, Figs. 15 and 22. In Fig. 15 six paper knives are shown; five of

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these carry this type of work and they also serve to show the variety it is possible to obtain with a few simple punches. These examples are the work of boys who have themselves decided on the design to be used. After showing the boys each punch and the simple unit mark it will produce, the teacher suggests ways in which these units can be combined to form pleasing results. The boys then sketch out a design on paper and submit to the teacher, who accepts it or suggests improvements if necessary.

The boys are made to practise the use of the punches on pieces of scrap metal and, when capable, allowed to punch the design on to their actual work. Simplicity should be insisted upon, particularly at first, and boys soon learn to discuss various designs and select suitable combinations of marks.

The designs shown on the two plates require for their execution four types of punch only, as follows:

For dots a centre punch; straight lines are produced with a chisel-like punch, either long or short and this can be used in two ways, either flat on the metal or tilted on to one end so as to form a cut, deep at one end and running out of the metal at the other, as in the star pattern shown on the nutcrackers. A punch in the form of a curved line, long or short radius, produces a variety of effects, while a round ended punch used on the corner of the metal produces a series of concave depressions or facets forming an interrupted chamfer. The paper knife on the extreme right and also the third from the right in the photograph have been decorated partly with this form

of punch mark. Punches of this type are easily made in the school. They should be finished off on their working edges, hardened and tempered, and their working edges made perfectly smooth afterwards with a fine oilstone slip. It should be remembered that the condition of the punch will be reflected in the mark it produces. For instance, a well finished bright round ended punch will produce a concave facet on the corner of a piece of mild steel which will sparkle and reflect the light, while a mark made by a badly finished punch will be dull and lifeless.

After the punching is completed, it is necessary to draw-file and emery-cloth the surfaces of the metal. The punches described do not cut but rather displace the metal, so any irregularity in the surface must be removed.

Very pleasing and satisfactory results are obtained by boys in this way but they must be taught to select and combine to make pleasing designs, simple and restrained, rather than to cover the surfaces of the work with a jumble of meaningless marks. While the punching is being done, the work itself should rest on a good smooth surfaced hammering plate; it is well if one or more plates are kept solely for the purpose. Any bruises or marks on these plates will be reproduced on the underside of the work and this, of course, should be avoided. For punching on the corners of work, a stop should be available to prevent the work from slipping; this can be arranged by fastening another suitable strip of metal on the top of the hammering plate.

SCHEME OF WORK

THROUGHOUT the following pages it has been deemed unnecessary to repeat any instructions that have previously been given. For instance, the preparation of metal for marking out has already been described and in the instructions to follow this will be indicated by printing in italics thus:—*Prepare for marking out.*

As the exercises proceed only such information as is necessary will be given, new work and operations being described as they occur.

During the early stages of the work the teaching should be done with the class or group as a whole, definite instruction being given in the correct handling of tools, treatment of materials, etc. This form of teaching should continue until such time as the boys

have learnt some at least of the fundamentals of the work and acquired a sense of responsibility in the workshop. But soon in the course, however, individual boys will begin to show special aptitude and speed; these boys should not be held back but allowed to proceed ahead of their fellows, provided that the standard of the work they produce is satisfactory. At the same time, the boys who are less quick should be encouraged and guided along sound lines. Eventually the teaching becomes more individual, a return being made to group or class teaching as convenient or necessary. Boys should be taught to apply the knowledge gained while performing one job to work of a similar nature, and to become self-reliant and dependable.

FIRST YEAR WORK

COAT HOOK

A working drawing of this is shown in Fig. 12.

Materials required.—(a) 1 piece B.D.S. $2\frac{1}{8}$ in. \times $1\frac{5}{8}$ in. \times $\frac{1}{8}$ in. (b) 1 piece B.D.S. $6\frac{1}{2}$ in. \times $\frac{1}{2}$ in. \times $\frac{1}{8}$ in.

Procedure.

Piece (a).—File one long edge true. *Prepare for marking out.* Mark out from true edge and file to shape and size. Draw-file all edges and remove sharpness. Set out on edge and face for chamfer and file up. Mark out and drill one rivet hole and countersink on back. Mark out and drill screw holes and countersink deeply on front to fit screw.

Piece (b).—File the radius on corners, using the eye to guide work, making all equal. Marking out of these small radii

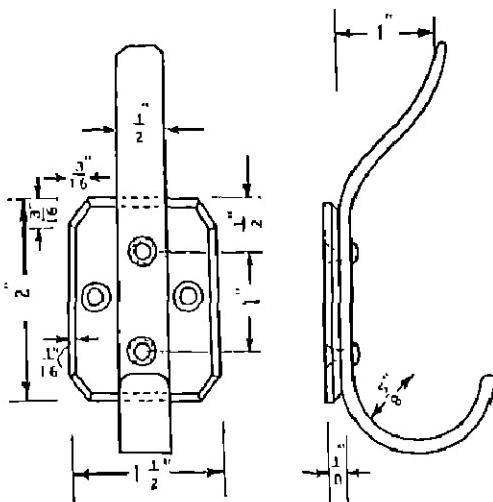


FIG. 12. WORKING DRAWING OF A COAT HOOK

should not be attempted; boys should be made to use their eyes. Mark out position of holes $2\frac{1}{2}$ in. and $3\frac{1}{4}$ in. from top end and in the centre of the metal by intersecting lines. Centre dot and drill $\frac{1}{8}$ in. holes. *Bend hook to shape round suitable formers.*

Both pieces.—Draw-file and finish all over. Secure them together with one rivet and set the hook square in position on the back plate. Drill the second hole in the back plate through the hole already drilled in the hook, countersink on back and rivet.

Procedure.

Piece (a).—It will be noted that this has been selected from stock $1\frac{1}{2}$ in. wide and as this is to be the finished size very little filing need be done. One of the original edges should be selected to mark from and any rough corners, etc., removed.

Prepare for marking out. Square lines across for length, file to lines testing for squareness from the selected edge. Draw-file all edges and remove sharpness. Mark out and file the chamfer or *punch edges* as

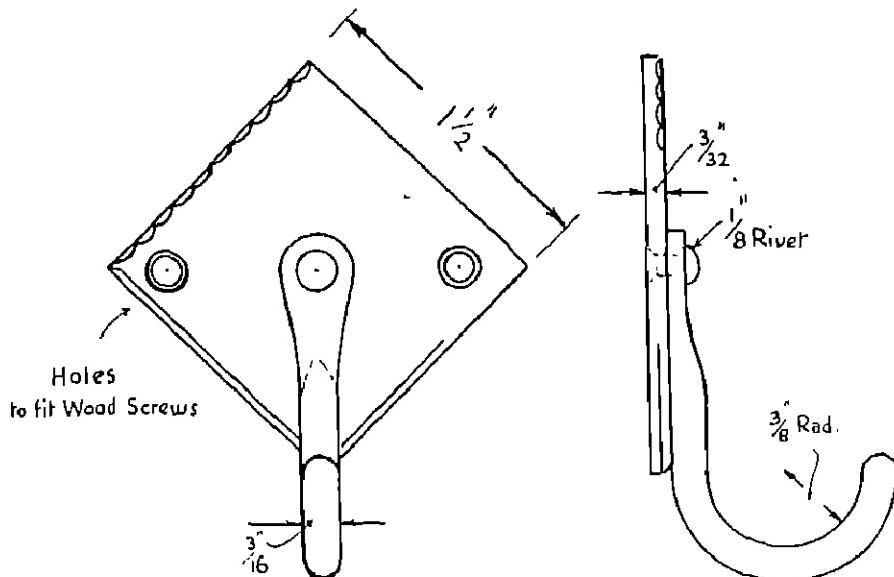


FIG. 13. WORKING DRAWING OF A COAT HOOK (ALTERNATIVE PATTERN)

File off surplus rivet ends at the back and remove any blemishes or sharp edges.

COAT HOOK

A working drawing of an alternative coat hook is shown in Fig. 13.

Materials required.—(a) 1 piece B.D.S. $1\frac{1}{2}$ in. $\times 1\frac{1}{4}$ in. $\times \frac{3}{64}$ in. (b) 1 piece B.D.S. or M.S. $\frac{3}{16}$ in. dia. A long length of about 18 in. is most convenient for boys to handle at this stage, it can then be cut off to correct length after working.

shown as alternative. Mark the centre by diagonals and also screw holes, drill holes and countersink. Finish by draw-filing and with emery cloth.

Piece (b).—Heat one end to bright red heat, and, allowing about $\frac{1}{2}$ in. to lie on the anvil, flatten with the hammer. If the hammer blows are directed so that they fall on the metal immediately above the edge of the anvil, the top surface of the metal will be made flat while the edge of the anvil will form the step on the underside; the metal also spreads out in width. This should be done in one heat if possible; the metal should not be made too thin. Heat again

slightly and hammer the two corners round. Great accuracy is not to be expected at this stage, but if a good job is not made first time the spoilt end should be cut off and another attempt made.

Saw off to $2\frac{1}{2}$ in. long, file up to shape and finish. *Bend cold round suitable former.*

After making sure that the finish of both pieces is satisfactory, rivet together.

PAPER KNIFE

A working drawing of this is shown in Fig. 14.

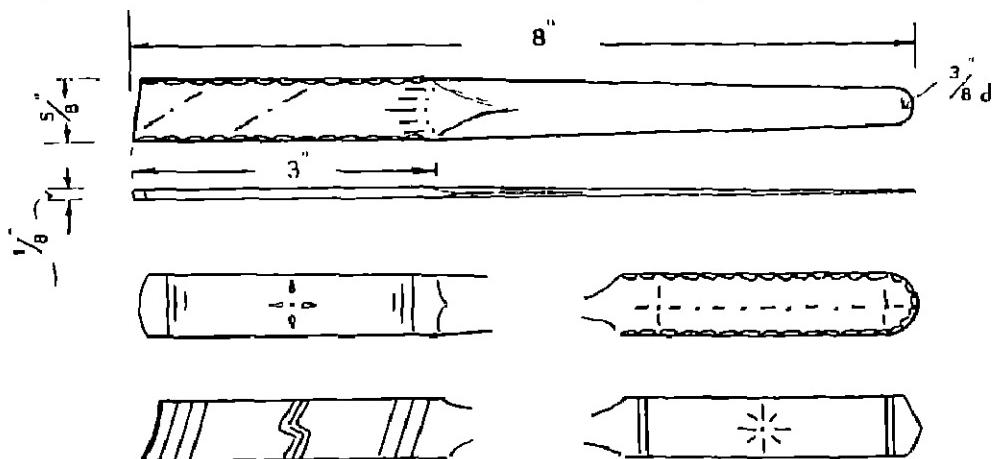


FIG. 14. WORKING DRAWING OF PAPER KNIFE, WITH ALTERNATIVE DESIGNS FOR HANDLE

Materials required.—1 piece B.D.S. $8\frac{1}{2}$ in. $\times \frac{1}{8}$ in. $\times \frac{1}{8}$ in.

Procedure.—*Prepare for marking out.* Mark a centre for the round end and set out a circle $\frac{3}{8}$ in. in diameter with spring dividers, a fine punch dot being marked at the centre in which the one divider point may hold. Square a line for the correct length from the extreme of the circle, and another 3 in. away from the end line, thus marking the limits of blade and handle. Scribe, with steel rule as guide, tangents to the circle running off the edge of the metal at the 3 in. line, thus marking the shape of the taper for the blade.

Note that in marking these lines with the straight edge it is best to have it resting firmly on the wider surface of the metal and not on the smaller part, which will be removed as waste. Saw and file away waste until the lines just remain visible. Mark centre lines on the edges to show the centre for the final edge and, holding the handle part in the vice, file a flat on each of the four corners. Remove the corners thus formed and gradually make the rounded surface and the sharp edges. The curves at the intersections of the handle and blade are produced with the round side of a small half-round file; this is a rather difficult

operation but good results can be obtained. The finishing of the curved surfaces should be done by draw-filing and rather more than usual is permissible here. Draw-file and finish all over.

A photograph of various designs, using punch decoration, is shown in Fig. 15.

OCTAGONAL CENTRE PUNCH (FIG. 18)

A working drawing of this is among those shown in Fig. 16.

Materials required.—1 piece cast steel; 3 in. $\times \frac{5}{16}$ in. octagonal section.

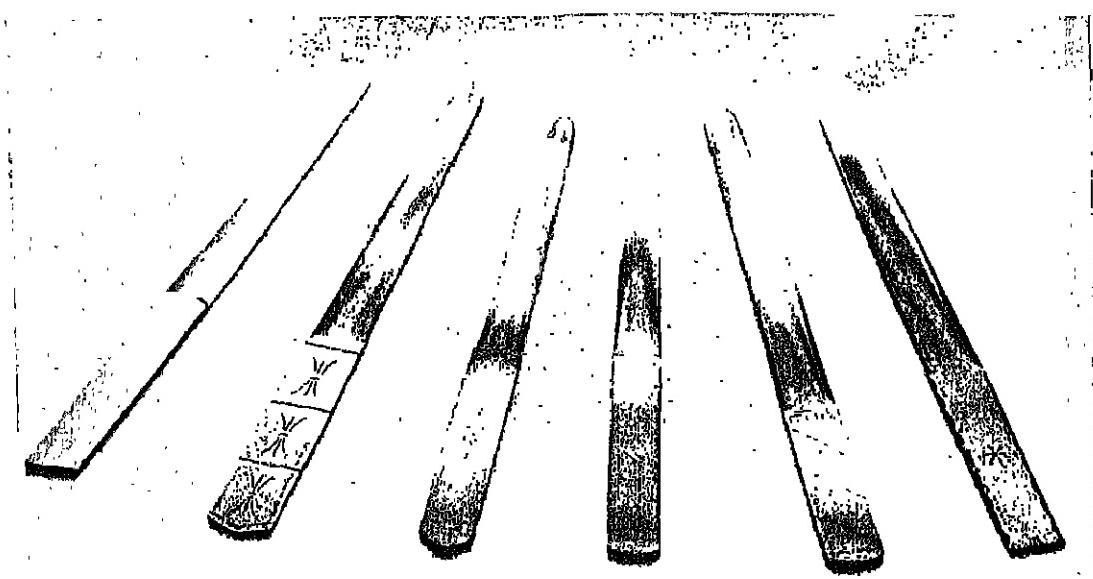


FIG. 15. A GROUP OF PAPER KNIVES MADE BY BOYS IN A SENIOR SCHOOL
Note the fine finish and the various designs.

Procedure.—Draw down the point, in the order square, octagonal, round. Finish with the hammer; form the short conical end in the same way. Do not overheat—blood red only—and do not use more heating than necessary.

A good finish from the hammer should be required in this exercise and it will help if the finishing is done at a low temperature with light hammer blows. Rough-grind, *harden and temper*, finish grind.

ROUND KNULED CENTRE PUNCH

A working drawing of this is among those shown in Fig. 16.

Materials required.—1 piece silver steel; $\frac{5}{16}$ in. dia. $\times 4\frac{1}{2}$ in. long.

Procedure.—Drill a centre hole in one end and, supporting this end on the back centre of the lathe, secure the other end

in the lathe chuck. Note that allowance has been made for removing the hole drilled in the end. Set the knurling tool in the tool holder and knurl for $2\frac{3}{4}$ in. of length. With a round nosed tool, turn recesses to just below the knurling. Remove from the lathe and saw away the centre hole. Wrap the knurled portion with emery cloth to protect it and hold it in a lathe chuck. Set the compound slide to a suitable angle and turn the short taper. Reverse in chuck, set the slide to a suitable taper and turn the long taper. These angles are not critical and may be found by trial and error. Remove from the lathe and rough-grind the point. *Harden and temper*. The actual striking point should be ground to an included angle of 60° .

SCRIBER AND STRIKING KNIFE

A working drawing of this is among those shown in Fig. 16.

Materials required.—1 piece cast steel, $4\frac{1}{2}$ in. long $\times \frac{3}{16}$ in. sq. section.

Procedure.—Great care is necessary in heating to prevent burning; the metal should not be made too hot. Heat one end and draw down to a point, in the order square, octagonal and finally round. This method prevents the formation of a hollow end and is also the quickest. This end should not require heating more than twice. The knife end needs flattening down; the metal will spread somewhat into the shape shown but some control of this may be necessary. Two "heats" only should be sufficient. The metal now requires annealing to relieve any strains that may have been set up in working and to restore it to its softest condition for filing.

This annealing is carried out by heating to an even full red, taking care not to burn the ends, and allowing it to cool slowly. If a metal box filled with sand is available, the work should be placed in this to cool

very slowly. When cold, the tool should be filed up, rough edges removed and finished. The twist can be made cold while in the soft state if not more than a half turn is given. The scribe now needs *hardening and tempering* at both ends by the "*point method*." Sufficient heat for a small tool of this description is obtainable in a bunsen flame. After hardening, grind both ends—and emery cloth to a fine finish.

The knife end should be ground and sharpened on one side only, the other remaining flat like a wood chisel. This should be done so that the flat side runs along the edge of the square when in use.

FISH SLICE

A working drawing of this is shown in Fig. 17.

Materials required.—(a) 1 piece 16 G. aluminium, $4\frac{3}{8}$ in. $\times 3\frac{5}{8}$ in. (b) 1 piece

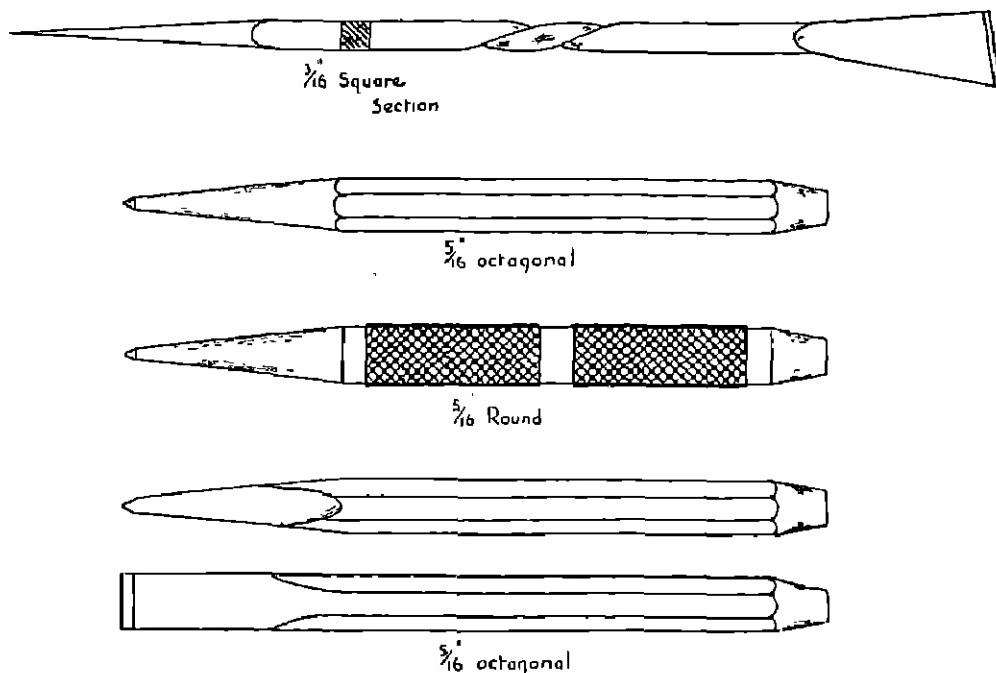


FIG. 16. WORKING DRAWINGS OF CENTRE PUNCH, SCRIBER AND COLD CHISEL

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aluminium 15 in. long; half round section $\frac{3}{4}$ in. $\times \frac{3}{16}$ in.; 2 aluminium rivets round head, $\frac{1}{8}$ in. $\times \frac{5}{16}$ in. long.

Note that as this metal is very soft, great care must be taken while making so as not to mark or damage the surface. Protecting clamps should be used over the vice jaws.

Procedure.

Piece (a).—File one long edge true; draw-filing only should be necessary and a smooth file used. No preparation of the surface is required as scribed lines will show clearly. Set out lines for length and width and also centres for holes. Cut off surplus with snips and radii at ends, file the front edge thin, as shown, and finish the edges by draw-filing, removing all sharp edges.

The filing of the bevelled front edge and some of the finishing may best be done while holding the work in one hand and the file in the other. Smooth files only should be used as rough ones tend to pull out particles of metal from the surface, and it is also a good plan to chalk the files to prevent the soft metal from clogging the teeth.

Mark out rivet holes, drill these and also those already marked. Bend up back on former.

Piece (b).—Flatten one end slightly on the hammering plate, preventing the metal from spreading by tapping lightly on the sides. This is to remove some of the high part of the rounded side so that the rivets will lie down neatly on the surface. File both ends to shape and finish with fine emery cloth. Bend in two places, as shown, and so that the bends fit correctly in position on piece (a). Place the two parts carefully together in their correct relative positions and, with a sharp pointed scriber, mark through one of the rivet holes in piece (a) on to piece (b). Centre-punch and drill this hole. Rivet together in this one position, set again for accurate placing and drill through the second hole. Rivet together and finally finish off.

CHISEL

A working drawing of this is among those shown in Fig. 16.

Materials required.—1 piece cast steel, $\frac{3}{4}$ in. $\times \frac{1}{8}$ in. octagonal.

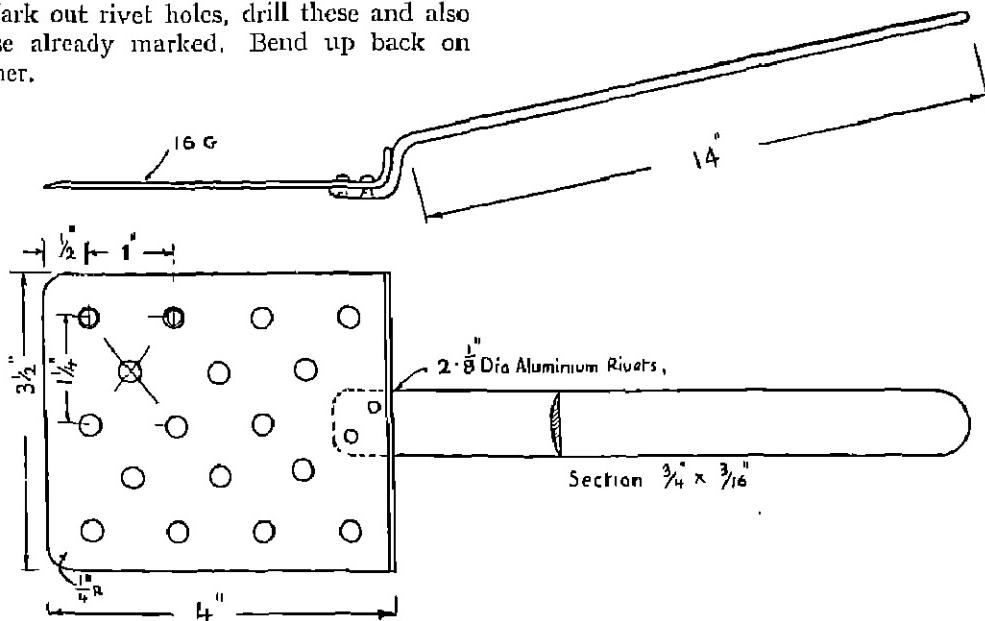


FIG. 17. WORKING DRAWING OF FISH SLICE

Procedure.—Draw down the short conical end as for the centre punch. Draw down the chisel end by hammering flat; this will also spread the metal in width and this spreading must be controlled by forging on the sides. When well shaped, anneal as already described. File up and finish all over. *Harden and temper.*

KEY RACK

A working drawing of this is shown in Fig. 18.

Materials required.—1 piece B.D.S., $5\frac{1}{8}$ in. $\times 1\frac{1}{2}$ in. $\times \frac{3}{32}$ in.; 1 piece wire, $\frac{1}{8}$ in. dia. \times 5 in.

Taking care not to flatten the wire in the vice, saw into five equal lengths. Each of these pieces must be shouldered for the riveting end to fit into the $\frac{1}{8}$ in. holes. This is best done in the lathe with the aid of a straight forming tool. This tool is made somewhat in the manner of a parting tool but is shorter and stouter. The wire is held in the lathe chuck with only a short portion projecting, and the tool is fed up to the rotating metal, cutting the shoulder to the correct length and diameter in one wide cut. The machine should be set so that the tool is in the correct longitudinal position when the wire projects a given length, and a stop could be arranged so that the tool can move so far and no farther, thus producing the correct diameter. The tool must

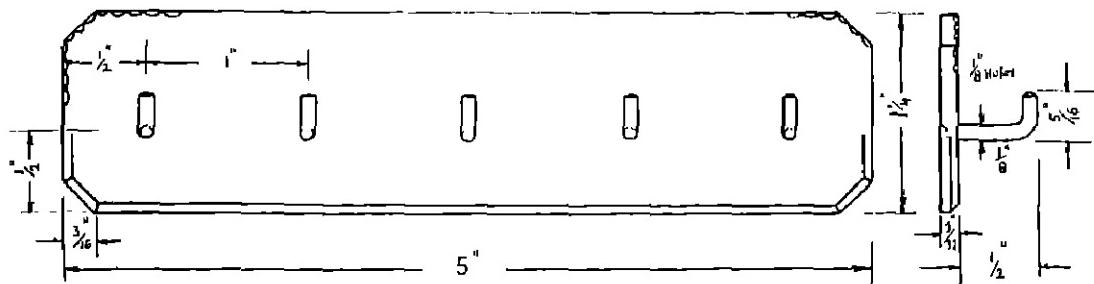


FIG. 18. WORKING DRAWING OF KEY RACK

Procedure.—*Prepare for marking out.* File up one long edge true; if this is made from B.D.S., as suggested, draw-filing only is needed. Mark out to the correct length and file up. Mark out the shape for corners, saw off waste and file up. Mark out and file the chamfer, if desired, or alternatively the punched edge. Set out centres for holes with square and surface gauge, and drill $\frac{3}{32}$ in. holes. While the $\frac{1}{8}$ in. diameter wire is in one length, it is best to clean up the surface in the lathe. As it is quite thin and weak, this is best done in sections. Allow a little more than 1 in. to stand out of the chuck and polish with emery cloth, then proceed with the next inch of the length; reverse in the chuck and polish the other end in the same manner, always working on the part nearest to the chuck.

be fed up to the metal very gently and made to cut all the time; it must not be allowed to rub. For work of this small diameter the height of the tool must be set to exact dead centre.

Having shouldered all five pieces, the domed ends may be produced in a similar manner with a slightly hollow forming tool fed up to the work from the end. This tool would have to be filed to shape, hardened and sharpened with a small oilstone slip. The hooks should now be bent to shape, care being taken not to damage them. The back plate should be draw-filed and finished. The several pieces might be coloured to prevent rust and finally the hooks are riveted in position and the surplus ends filed off.

SECOND YEAR WORK

CABINET FITTINGS—1. STAY FOR FALL DOOR

A working drawing of this is shown in Fig. 19.

Materials required.—2 pieces B.D.S., $1\frac{1}{2}$ in. $\times \frac{1}{2}$ in. $\times \frac{1}{16}$ in.; 1 piece B.D.S., $1\frac{1}{2}$ in. $\times 1\frac{1}{4}$ in. $\times \frac{1}{16}$ in.; 1 piece B.D.S., length to suit $\times \frac{1}{8}$ in. $\times \frac{1}{8}$ in.; rivets.

Procedure.—*Prepare and mark out* all pieces. Saw away all waste and file up; the stay is rounded on all sides. The bending needs some explanation. The shaped piece should be sawn down on the sides of the lugs so that it can be bent at the positions indicated by the dotted lines; this will bring the thickness of the metal inside the width of the flanges. The actual bending is done on a former in the vice. The drilling of the rivet hole should be done after bending and a hard wood packing piece inserted between the lugs to prevent them closing in under the pressure of the drill. The bent guide loop should be riveted on to its back plate before bending and while this must be secure it must also be free to turn on the rivet; it would be an advantage for this purpose if the hole in the back plate could be made slightly larger than the diameter of the rivet. Having riveted these two pieces together the bending is done on a former which will have to be made for the purpose. This should be the same section as the stay which is to run through the loop, but somewhat larger. All filing up and finishing should be done before bending and assembling. $10\frac{1}{2}$ in. is a useful length for the stay but, of course, it could be any reasonable length to suit a particular cabinet door.

2. HANDLE OR DRAWER PULL

A working drawing of this is shown in Fig. 19.

Materials required.—1 piece B.D.S., $2\frac{1}{2}$ in. $\times 1$ in. $\times \frac{1}{16}$ in.; 1 piece B.D.S., $1\frac{1}{2}$ in. full $\times \frac{3}{8}$ in.; $\frac{1}{8}$ in. dia. soft iron wire for rivets.

Procedure.—Prepare, mark out and file up the back plate. Mark out and file up the chamfer or punch edge, as desired. Draw-file the square piece on all sides, square off ends and *prepare for further marking out*. On one surface mark out a line for the slope $\frac{1}{8}$ in. from all edges. This is the only guide that can be put on the metal for the shaping, but a sliding bevel can be set to the correct angle and, using this in the manner of a square, the sides can be checked as the filing proceeds. This filing of a wide surface is much more difficult than filing up edges true and some care must be exercised if these surfaces are to be flat. If they are not reasonably flat the work cannot be regarded as satisfactory. The two pieces are to be secured together by means of two flush rivets made from the $\frac{1}{8}$ in. dia. wire. The holes for these should now be marked out on the back plate and accurately drilled, 1 in. apart on the centre line of the plate. Remove any rough edges from round the holes which have been thrown up by the drilling and secure the two pieces together in their correct relative positions by means of a hand vice or toolmaker's clamp. Drill through the second piece, using the piece already drilled as a guide. The fronts of the holes in the handle and the backs of those in the back plate have now to be slightly countersunk.

Drill and countersink the screw holes to suit screws, finish off all surfaces and put on any decoration intended before riveting

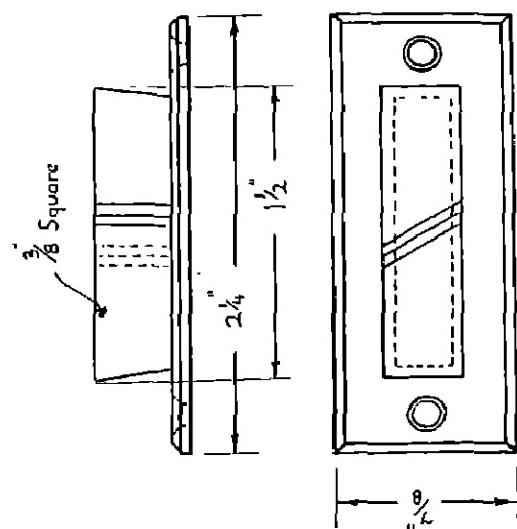
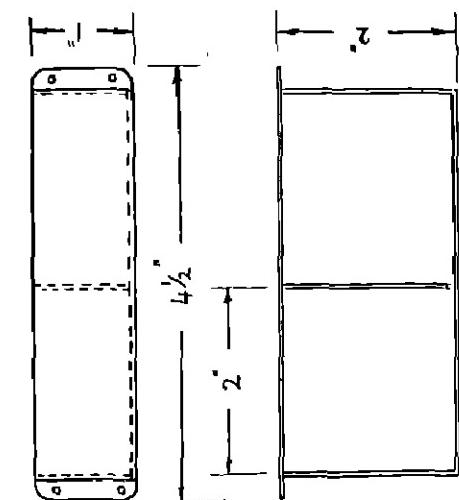
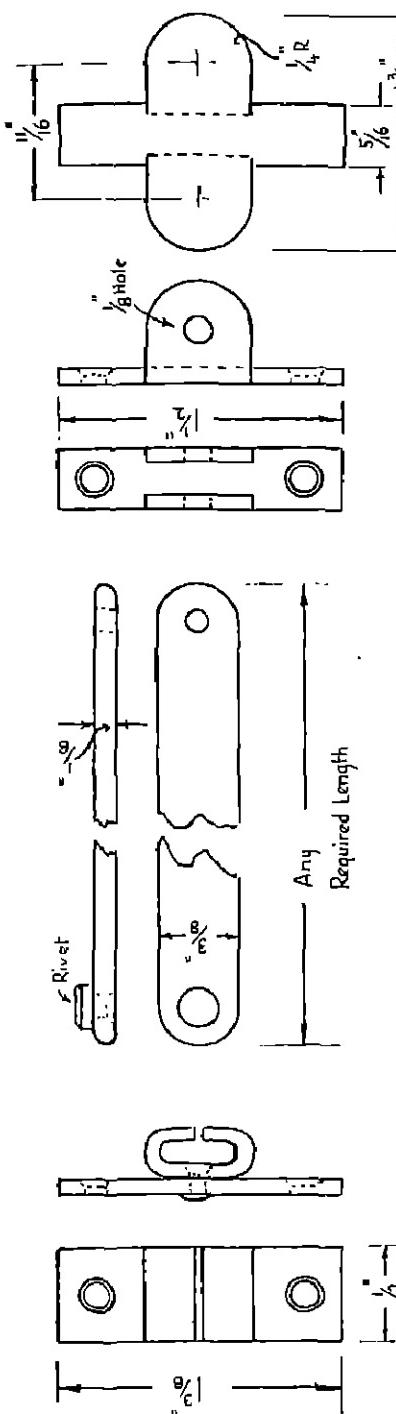


FIG. 19. WORKING DRAWINGS OF CABINET FITTINGS
*Top row: STAY for Fall Door
 Bottom row: left, HANDLE or DRAWER PULL; right: STUD Box*

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together. The wire should be a good fit in the holes and a full half inch in length should be enough if the countersinking is only shallow, as it should be. Refer back to the notes on *Riveting* if doubtful of procedure. Finish off by filing the surplus ends with a smooth file, emery cloth and colour.

3. STUD BOX

A working drawing of this is shown in Fig. 19.

Materials required.—Sheet brass, 1 piece $4\frac{1}{2}$ in. \times 1 in. \times $\frac{1}{32}$ in.; 1 piece 8 in. \times 1 in. \times $\frac{1}{16}$ in.; 1 piece 4 in. \times 2 in. \times $\frac{1}{32}$ in.; 1 piece 2 in. \times 1 in. \times $\frac{1}{32}$ in.

These pieces should be marked out on the sheet and cut with snips to the required size, no filing to size being required, only a slight draw-filing and a removal of the sharp edges.

Procedure.—Mark out the 8 in. \times 1 in. piece for bending positions and bend in folding bars or on a former to sharp angles, tapping gently to make angles as sharp as possible without cracking. It is a help if the bending lines are scored deeply on the inside; this helps to make sharp corners. If a hammer is used, care must be taken to prevent bruising and it may be wise to use a mallet only, but if skilfully used a hammer is better; it supplies a more solid and direct blow. Shape the $4\frac{1}{2}$ in. \times 1 in. piece for the back and secure these two pieces together in position with binding wire. Silver-solder together with a hard solder. Cut the 2 in. \times 1 in. to fit accurately inside and also to $\frac{1}{32}$ in. in width; this is to allow for the bottom. Bind in position and silver-solder with a medium solder. Place the part of the box already constructed over the piece for the bottom and scribe on to it round the inside of the box, cut away the waste so marked to fit snugly inside and, after binding in position, silver-solder with easy solder. In no case should surplus solder be used or a

ridge of metal will be formed inside which is most difficult to remove.

The box should now be cleaned in acid and cleaned up with fine emery cloth and polished. Drill the four screw holes. This is only one of several methods of constructing a box of this kind; if quite sharp corners are required, thicker metal may be used and separate pieces soldered together to form the sides. It may also be made from aluminium and the joints lapped and riveted. It could also be made from tinned plate, soft-soldered together and carefully enamelled in any desired colour. Boxes of this type will be found useful for fitting on the inside of a drawer or door to contain studs, collar stiffeners, cuff links and similar small dress requirements.

TOASTING FORK

A working drawing of this is shown in the upper part of Fig. 20.

Materials required.—1 piece B.D.S., approx. $17\frac{1}{2}$ in. \times $\frac{1}{16}$ in. sq.; 1 piece steel wire 12 in. long $\times \frac{1}{16}$ in. dia.

Procedure.—Draw-file and finish the long piece of square stock. Bend a complete ring at one end, round a 1 in. diameter former and saw off this ring. Tap this ring gently on a flat plate to make it lie in a true plane and to take out any twist that may have occurred during bending. Cut and file up the ends of the ring to fit on to the end of the remaining piece of $\frac{3}{16}$ in. square metal. Allow the straight piece to protrude slightly into the ring and braze into position. Clean up joint and remove surplus from the inside ring. Mark out and drill the two $\frac{1}{16}$ in. holes for the wire, cut the wire into the two lengths required and form points. This is best done on the grinding wheel by revolving the wire while holding it against the wheel at the required angle. Clean up the wire bright with emery cloth, insert and hard-solder into the holes.

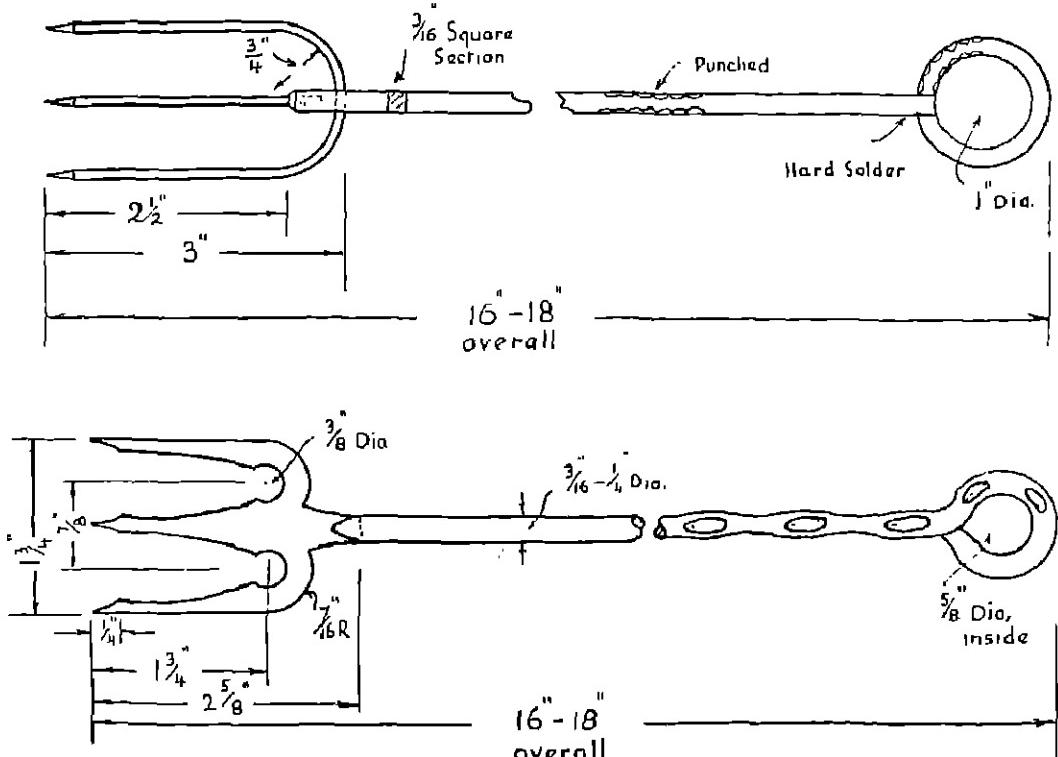


FIG. 20. WORKING DRAWINGS OF TOASTING FORKS (TWO DESIGNS)

Bend the outside prongs on a suitable former. Punch or chamfer as desired, clean up and polish all over; colour if required.

TOASTING FORK

A working drawing of this is shown in the lower part of Fig. 20.

Materials required.—(a) 1 piece brass, $2\frac{1}{4}$ in. $\times 1\frac{1}{4}$ in. full $\times \frac{1}{16}$ in. (b) 1 piece brass rod, 16 in. long approx., $\frac{9}{16}$ in. dia.

Procedure.

Piece (a).—File one long edge true and mark out complete shape. Drill two $\frac{1}{8}$ in. diameter holes in the positions indicated and cut away the waste into these holes and also round the outside. This may be

done with either a hacksaw or a piercing saw. If the sawing is done with a hacksaw, cuts along straight lines can be made, and this leaves rather more filing to be done than if the sawing is carried out with a piercing saw; in this case, the correct curvature can be followed quite close to the lines, leaving a very small amount to be removed with the file. Both methods are quite satisfactory, however, and either may be used according to the previous experience of the worker. When shaping the tongue which is to fit into the handle it is best to leave this rather larger than necessary so that it can be finished off flush after jointing.

Piece (b).—Bend the curved end round a suitable former, taking care not to bruise the rather soft metal in the vice. Rough-shape the end for the joint and make a suitable saw cut to receive the tongue left

for the joint on piece (a). A trial should be made for this on a scrap piece of metal, a saw blade of suitable thickness being selected; it may be necessary to use two thin blades together in the saw.

Clean up both pieces all round the joint, fit together and silver-solder. File up all over with a smooth file and finish off.

The depressions along the handle may be made by means of a suitable punch, the centres of these being marked with a pencil after measurement. Four rows are required on centre lines equidistant round the circumference of the rod. The depressions should be spaced so that alternate rows are spaced in between those of the last row marked.

The punch required is elliptical in section and slightly domed on its working end, which should also be highly polished. All punch marks should be of equal value, equal weight being given to all the blows directed on the punch end. Some straightening may be necessary as the work proceeds and at the end of the punching.

NUTCRACKERS

Working drawings of these are shown in Fig. 21.

Materials required.—(a) 2 pieces B.D.S., $6\frac{1}{2}$ in. $\times \frac{3}{8}$ in. $\times \frac{3}{8}$ in. (b) 1 piece B.D.S., $1\frac{1}{2}$ in. $\times 1\frac{1}{2}$ in. $\times \frac{1}{8}$ in.; soft iron wire for rivets, $\frac{1}{8}$ in. dia.

Procedure.

Pieces (a).—Draw-file all sides and *prepare for marking out*. Set out by marking a fine centre dot slightly more than $\frac{3}{16}$ in. from one end and in the centre of the metal; carry a line round the metal from this centre to the opposite side and obtain a similar point immediately under the first. Set spring dividers to $\frac{9}{16}$ in. and set out circles at each of the two points marked. Square a line round the metal 2 in. away from the centre of the circles marked and join up

the centre of the circle with the edge of the metal at this line. Marking should be done on both sides in this case as the metal is thick and more guide is required if the filing is to be kept square. Some of the waste may be removed with the hacksaw and the shaping finished with suitable files. Mark out the slots for piece (b) with square and surface gauge. Two saw blades should now be secured together in the hacksaw frame and a wide cut made in between the lines marked. File out the slots with a warding or other thin file until piece (b) fits tightly; this will allow for cleaning up the piece (b) and for final fitting. Drill the $\frac{1}{8}$ in. holes for the rivets in pieces (a) and countersink slightly on each side. This may be done before cutting the slot, if desired, or a piece of hardwood or metal may be inserted in the slot while drilling to prevent the metal closing in at the slot. Mark out and file-chamfer or set out and punch-design as required.

The teeth for preventing the nuts from slipping are made with a centre punch or the corner of a small cold chisel, the punch or chisel being tilted over to push up the metal. The position of these teeth should be accurately set out; they should not be punched in anywhere.

Piece (b).—*Prepare for marking out*. File up one long edge and set the complete shape. Cut away waste and file up to lines. Drill holes. When filing the sloping side where marked on the drawing as $\frac{1}{2}$ in. approximately, it is a good plan to place the work in position with two temporary wires in the rivet holes and adjust the shape and size here as required to fit accurately. The final filing at the slot must, of course, be done first. Finish off all parts by draw-filing and with emery cloth. Rivet together and clean off the ends of rivets. The work could be coloured if desired; this type of finish is well suited to the job.

Two examples of this piece of work are shown in Fig. 22. These are the work of senior school boys and show the excellent standard that can be attained.

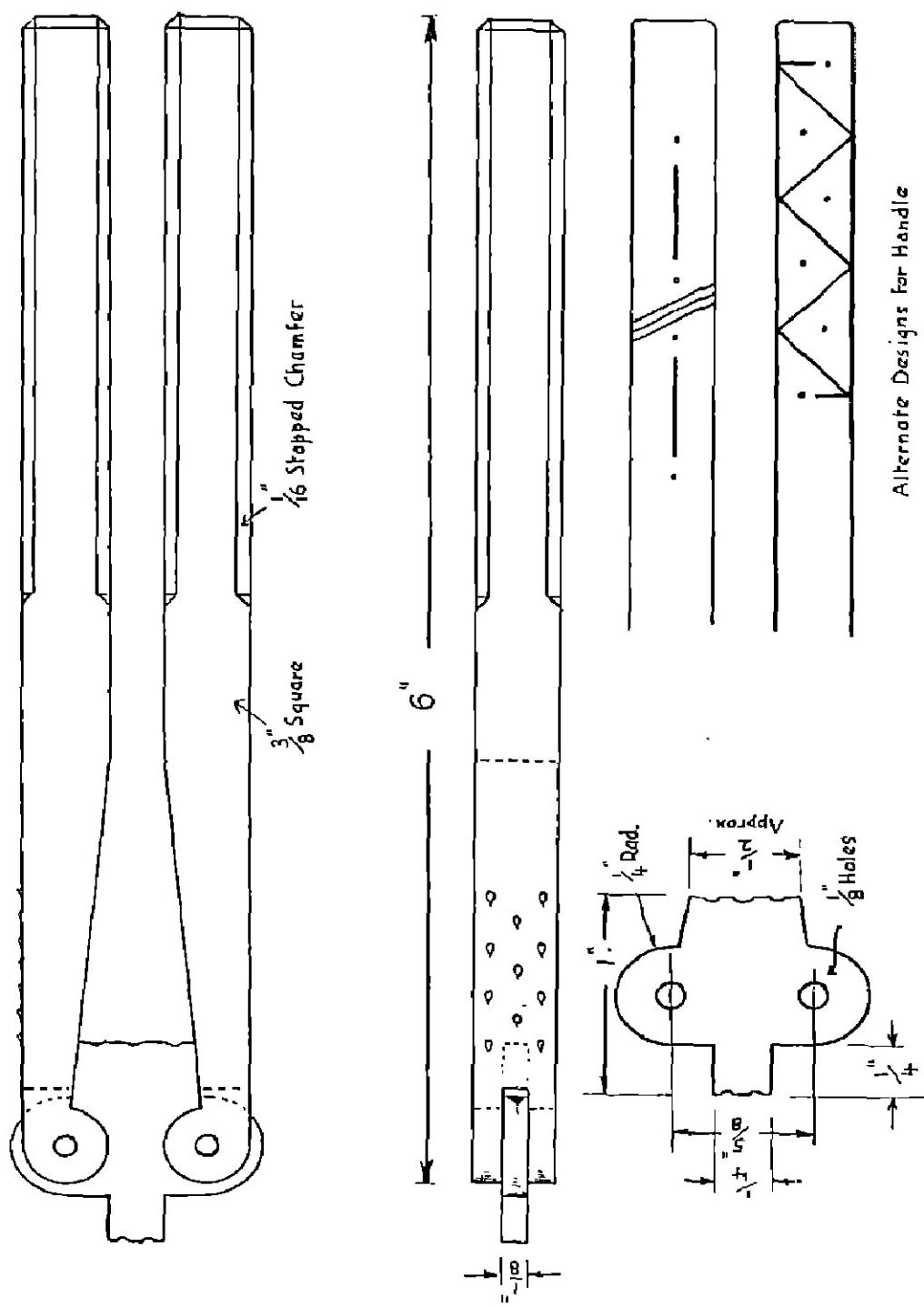


FIG. 21. WORKING DRAWINGS OF NUTCRACKERS—ALTERNATIVE DESIGNS FOR HANDLE

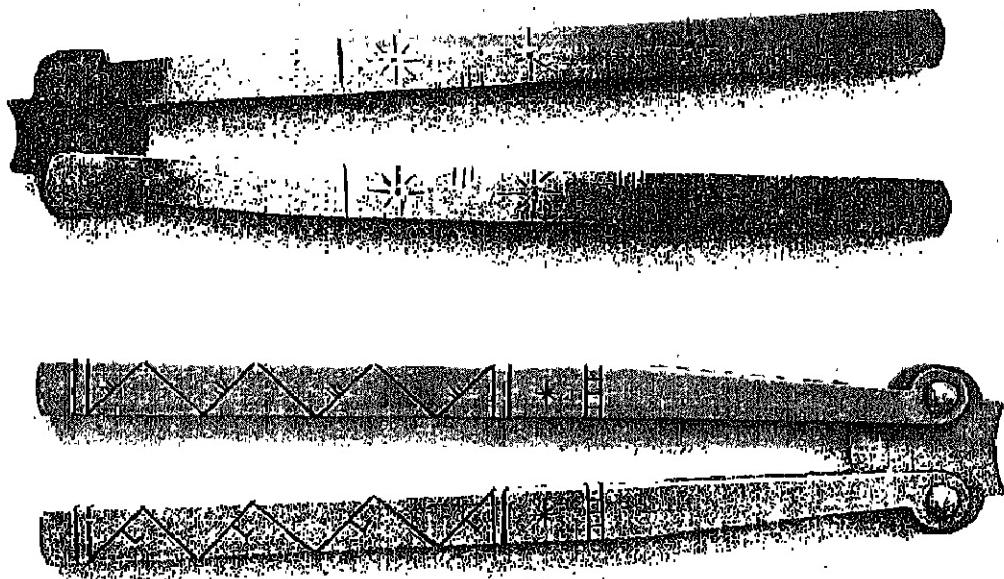


FIG. 22. WORK DONE BY SENIOR SCHOOL BOYS
Note the punched design and alternative methods of riveting.

DUST PAN

A working drawing of this is shown in Fig. 23.

Materials required.—Tinned plate. (a) 1 piece $10\frac{3}{4}$ in. \times 10 in. (b) 1 piece $6\frac{1}{2}$ in. \times $1\frac{1}{4}$ in.

Procedure.—Mark and cut the two pieces accurately and directly from the sheet; no further treatment of the edges is necessary. Set out the larger piece to the dimensions given in the development drawing in the usual way with square and surface gauge. A template may be made and used for setting out the curved bending lines if desired. Cut away all waste and bend all safe edges in the direction indicated on the drawing; this should be done in folding bars. Next bend up the two $\frac{1}{4}$ in. laps in the waist of the pan and then along the curves; this is the only place where difficulty may be experienced but these curves can be tapped over the edge

of a stake with a mallet. The other bends can be made over the edges of suitable stakes mainly with the fingers and hands alone. Too great a use of the mallet should be avoided. It should also be noted that any suitable piece of metal may be used as a stake, a little improvisation often being necessary if no expensive tinned plate equipment is available.

The handle should next be dealt with, safe edges first, curves next, bending round suitable formers or stakes, using hands and fingers only where possible. Any surplus length should now be cut off and the laps bent. All the seams of the body should now be securely soft soldered together and the handle soft soldered in position.

The article may be finished with a bright enamel and is an example of really satisfactory tinned plate work. Some preliminary exercises in bending and soldering should be given before this rather more difficult work. It is not a really difficult job, however, and well within the capabilities of the average boy.

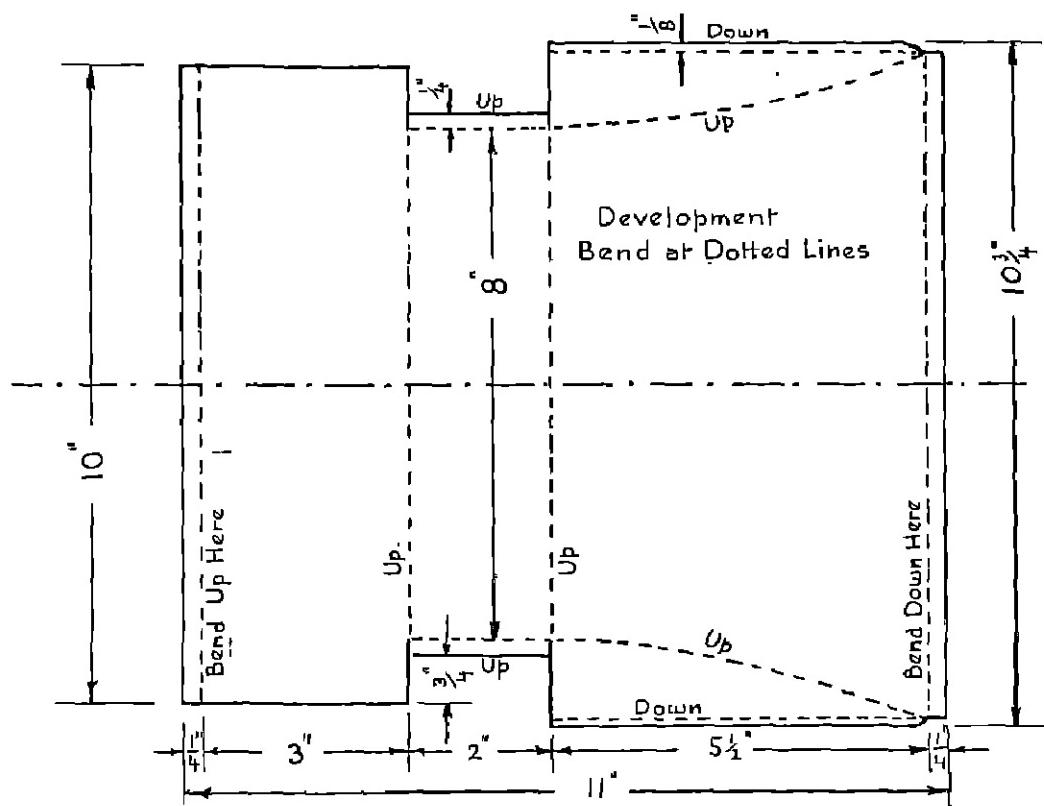
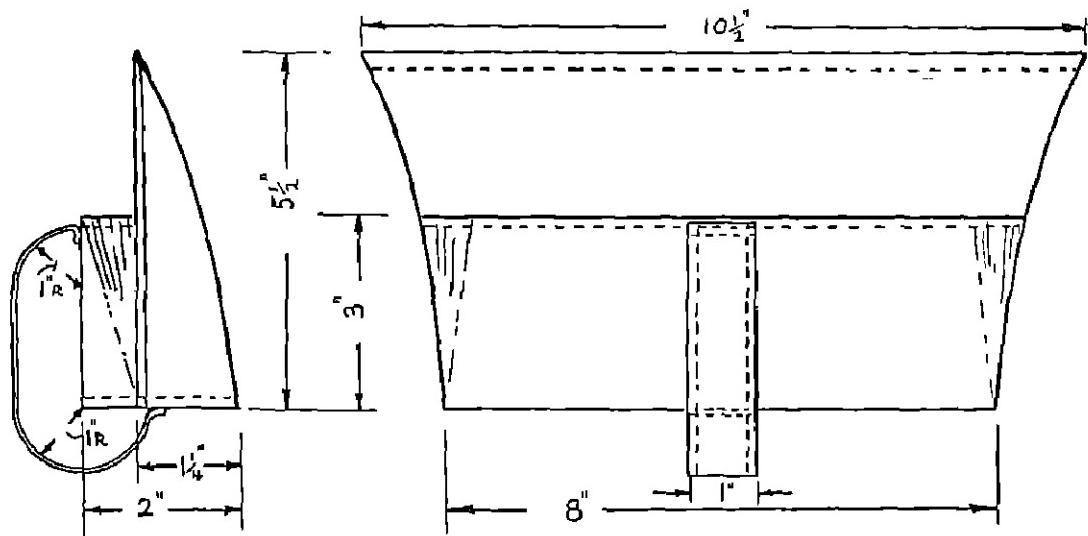


FIG. 23. WORKING DRAWINGS OF DUST PAN, INCLUDING DEVELOPMENT

THIRD YEAR WORK

INK STAND

A working drawing of this is shown in Fig. 24.

Materials required.—1 piece B.D.S. 11 in. \times 5 in. \times $\frac{3}{32}$ in.; 1 piece brass $8\frac{1}{2}$ in. \times $1\frac{1}{2}$ in. \times $\frac{1}{32}$ in.; 1 piece brass $10\frac{1}{2}$ in. \times $1\frac{1}{2}$ in. \times $\frac{1}{16}$ in.; 1 piece brass $9\frac{3}{4}$ in. \times $2\frac{1}{2}$ in. \times $\frac{1}{16}$ in.; 1 piece brass 12 in. \times $\frac{3}{16}$ in. \times $\frac{3}{16}$ in. square; 1 piece brass 2 in. \times $\frac{5}{16}$ in. \times $\frac{5}{16}$ in.

square; 2-4 B.A. \times $\frac{1}{2}$ in. cheese head brass screws; 2 nuts; 2 washers; short length $\frac{1}{16}$ in. brass wire.

Procedure.—File up the piece for the base to size and bright on one large face. Bend the ends on a former. It is possible to do this cold but boys may lack the necessary strength required if the plate is $\frac{3}{32}$ in. thick. The bending may be assisted by playing the blow pipe flame along the bending line

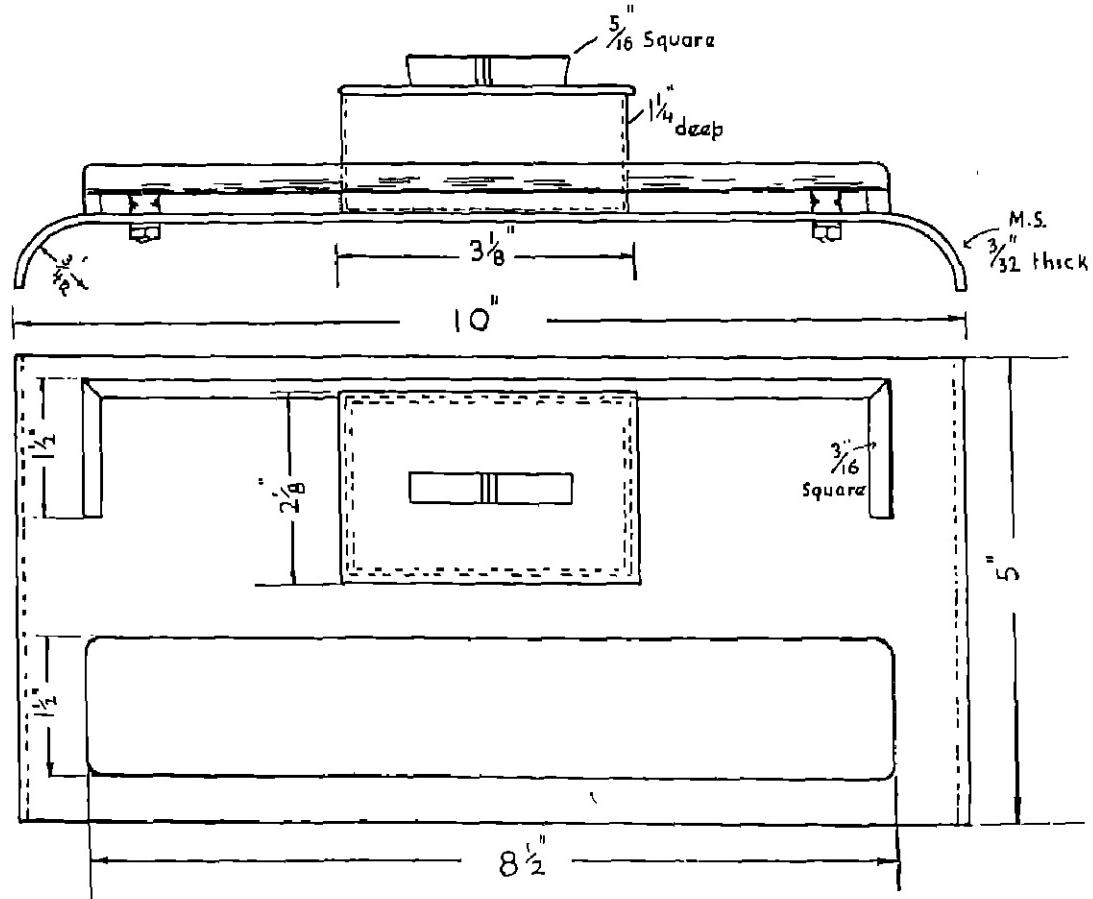


FIG. 24. WORKING DRAWING OF INK STAND

and thus bending hot. The bending should be done as far as possible with the hands, protected from the heat of course. If, however, blows must be struck, a piece of short grained hardwood should be used in contact with the metal, against which the hammer may be used without unduly damaging the surface of the metal.

When bent to shape, it will be necessary to remove any oxide caused by the heat and

For the box, make the body in four separate pieces; these must be filed up accurately to size and silver-soldered together. Next fit the bottom inside the sides, and this may be soft-soldered in position.

The lid is made in two thicknesses, one fitting inside the sides and the other overhanging as shown in the drawing. File up the handle to the desired shape and size;

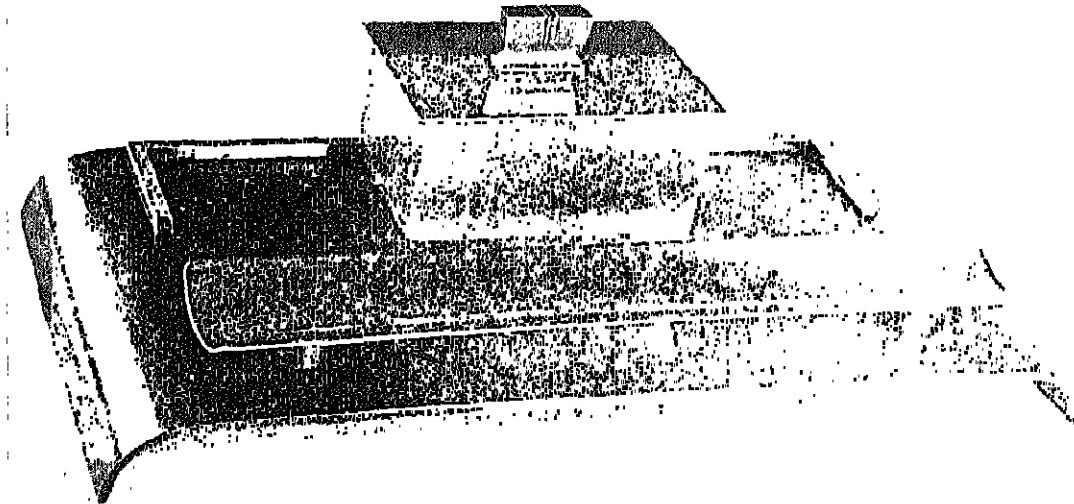


FIG. 25. THE FINISHED INK STAND
Note the rather more difficult handle.

clean up to a good surface. Set this part aside for the time being. File up to size and shape the piece for the pen tray, rounding the corners and edges. Emery cloth, polish all over, and bend round a former. Now take the two cheese-headed screws and with a half round file shape the top of the head to fit on the rounded side of the pen rest. Silver solder in position and re-polish. Now mark out and drill in the base two clearance holes for the screws.

alternative shapes and designs may be introduced here.

These three pieces have now to be secured together; this may be done by silver-soldering the handle to the top and then by sweating together the two flat pieces. The whole box should now be cleaned up and polished. Two small screws should be employed to secure the box in position on the base; these should have countersunk heads fitted flush with the bottom so as not

to project inside the box, and should be secured under the base with washers and thin nuts. The $\frac{3}{16}$ in. square section brass is next cut and fitted into position. The top surface may be slightly rounded to give a cushion effect. Next a number of $\frac{1}{16}$ in. diameter holes should be drilled through the base and half-way through the square brass. Three in the long piece and two in each of the short pieces will be satisfactory. The drilling, which must be marked out on the centre line of the brass, is best done while the pieces are held in position as already explained. Short lengths of $\frac{1}{16}$ in. diameter brass wire are now soldered into the holes in the $\frac{3}{16}$ in. square brass, leaving them sufficiently long to pass through the base and rivet over slightly underneath.

Before assembly all parts must be well finished, and this job looks particularly well if the base is *coloured* to a rich blue-purple by the process already described; note that in this case a blow pipe will be necessary to produce the heat for so large a surface. Finally the parts are assembled. A photograph of the finished work is shown in Fig. 25.

HEARTH SET—1. STAND

A working drawing of this is shown in Fig. 26.

Materials required.

Frame.—1 piece B.D.S. 60 in. \times $1\frac{1}{2}$ in. \times $\frac{3}{16}$ in.

Feet.—2 pieces B.D.S. $7\frac{1}{2}$ in. \times $1\frac{1}{2}$ in. \times $\frac{3}{16}$ in.

Hangers.—4 pieces B.D.S. 4 in. \times 1 in. \times $\frac{1}{32}$ in.; $6-\frac{3}{16}$ in. \times $\frac{5}{8}$ in. round head rivets.

Procedure.—Bend the frame to shape and braze the joint; probably the best position for this is in the centre of the bottom side. Braze on the outside by leaving a slight V-shape on the ends and fitting the inside edges well together. Only a very thin line of brass will then show when the stand is in use.

Bend the feet on a former and drill rivet holes in both feet and stand.

Make hangers to particulars given and drill rivet holes. Clean up to a fine finish and rivet all parts soundly together.

This stand looks well if coloured to a uniform dark blue.

2. HANDLES

Working drawings of these are shown in Fig. 27.

Materials required.—1 piece B.D.S. approx. $3\frac{1}{2}$ in. \times $\frac{7}{8}$ in. dia.

Procedure.—This is, of course, lathe work and the procedure varies to some extent in accordance with the design chosen. Several suggestions for suitable designs are given, but one feature is common to all. This is the groove near the top, which, of course, is necessary for hanging on the hanger provided on the stand. This groove is formed in the lathe with a suitable parting tool.

Whatever design is chosen, the best method for turning will probably be between centres, particularly where taper shapes are included. For a short taper such as required in this case, the angle is best obtained by setting over the top slide of the compound tool rest of the lathe. The turning of the ends to shape, including the removal of the centre holes, must be done in the lathe chuck. Protect the finished parts to be held in the chuck by wrapping with emery cloth. Any decorative lines running round the circumference, such as those indicated in the first design shown, should be put on with a sharp pointed tool similar to a screw-cutting tool. This, of course, is done in the lathe. The spiral lines shown in the second design are made in a similar manner but in this case a fast train of screw-cutting wheels must be set up and the machine pulled round by hand. Lines could also be made running along the length and arranged in some

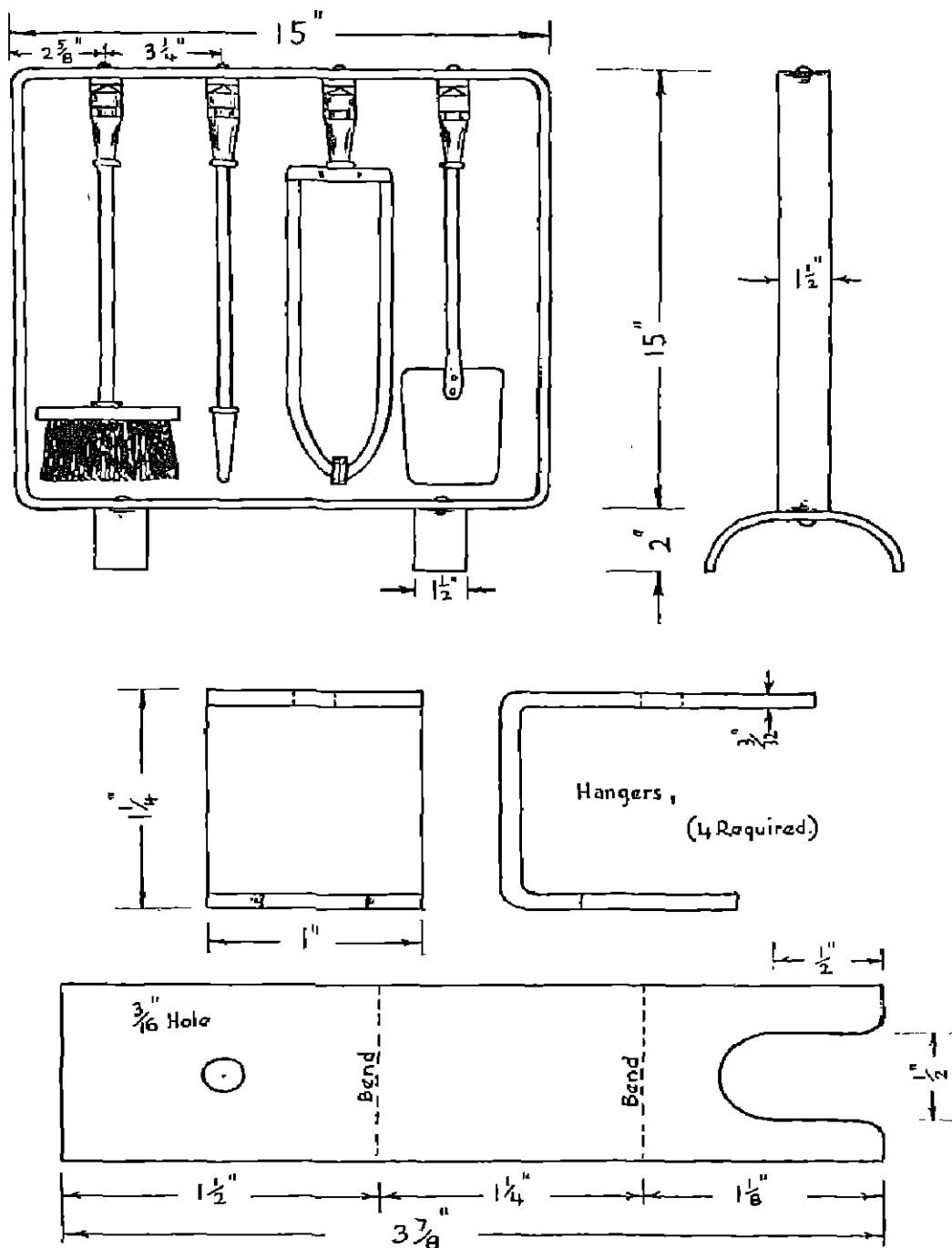


FIG. 26. WORKING DRAWING OF HEARTH STAND
This gives a general idea of the finished stand and the dimensions of the actual stand.
Before : DETAILED DRAWING OF THE HANGERS

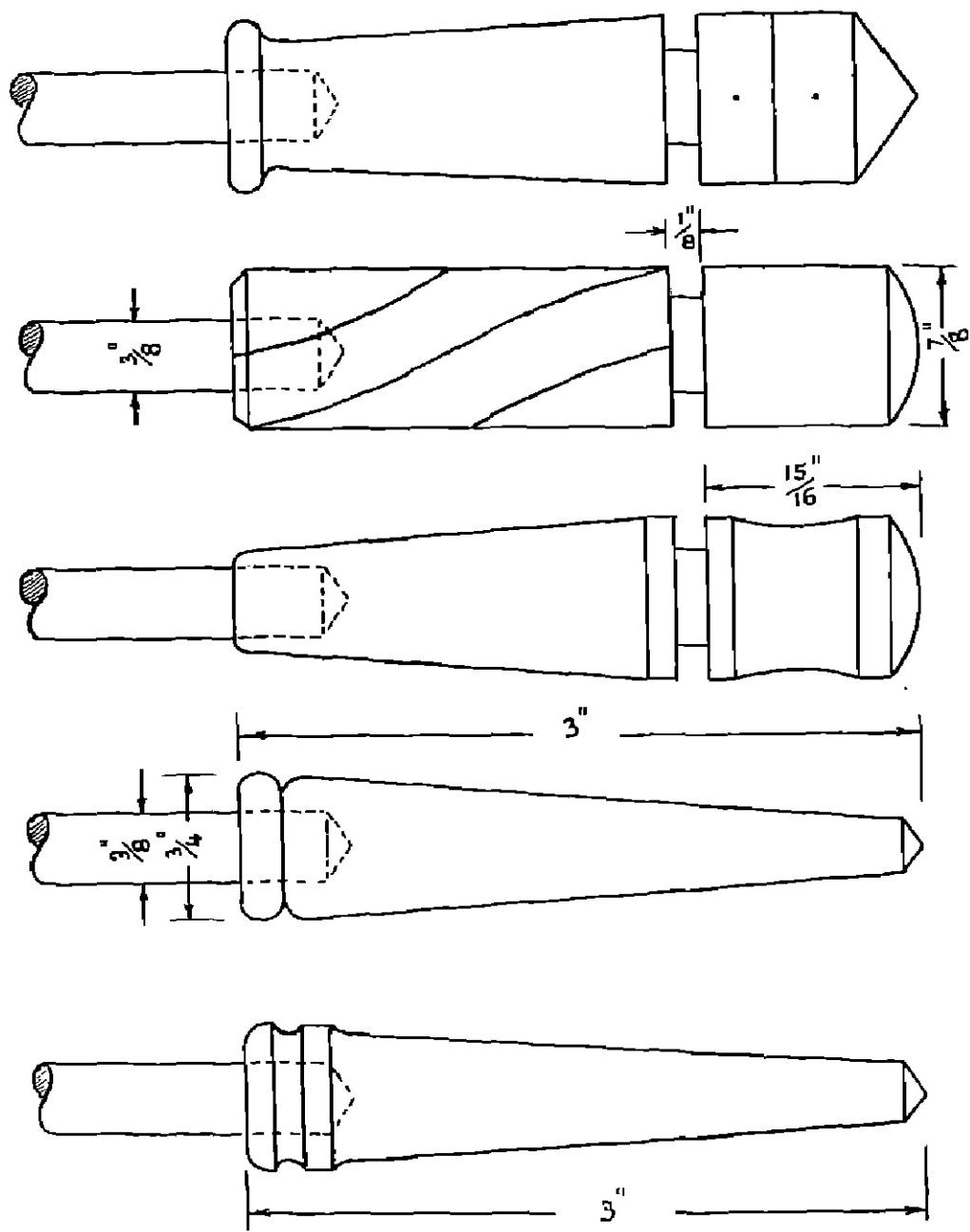


FIG. 27. WORKING DRAWINGS OF HANDLE AND POKER BOLTS FOR HEARTH SET
 Three alternative designs are given for handles and two for bolts

preconceived order round the circumference. In any of these cases a very shallow cut is all that is necessary—a mere scratch in fact. The drilling for the stem should also be done in the lathe, the drill being held in a chuck fitted in the tail stock, the work rotated and the drill fed into the end.

In the case of the handle for the tongs, a stem is turned on the end for riveting or screwing through the cross bar. This could be turned down first and, if desired, held in the lathe chuck and the other end supported by the tail stock centre while the shaping proceeds.

3. POKER BOLT

Working drawings of poker bolts are shown in Fig. 27.

Material required.—1 piece B.D.S. 4 in. $\times \frac{3}{4}$ in. dia.

Procedure.—The material specified is 1 in. longer than the finished size; this is to give some extra length for holding in the lathe chuck while turning. If small careful cuts only are taken, this can be done without supporting the free end. Turn to the required shape, reverse in the chuck and, still holding the spare metal, drill and lap the end to receive the stem. This will mean, of course, drilling right through the waste. Remove from the lathe and saw off to length; the end can be faced in the lathe if care is taken to wrap with emery cloth to protect and also to take very light cuts.

4. STEM

Materials required.—1 piece $\frac{3}{8}$ in. dia. B.D.S. for each, various lengths as required.

Procedure.—For the poker, the metal needs a thread cutting at each end and polishing only. For the brush a thread is necessary at one end, $\frac{3}{8}$ in. diameter, while the other end needs shouldering down in

the lathe to $\frac{1}{8}$ in. diameter and sufficiently long to allow it to pass through two washers and a hole in the wooden part of the brush, leaving enough length for a nut to secure. Brushes for this purpose are reasonably easy to make, or they may be bought. For the shovel, one end should be screwed and the other forged to a suitable shape.

5. SHOVEL

It should be noted that a shovel in a set of this description is needed only very occasionally and its function is mainly to pick up small pieces of fallen coal. The one shown in the working drawing, Fig. 28, fulfils this purpose and at the same time is kept within the capabilities of a boy to make.

Materials required.—1 piece M.S. plate $4\frac{1}{2}$ in. $\times 3\frac{1}{8}$ in. $\times \frac{1}{16}$ in., bright if possible.

Procedure.—*Prepare for marking out.* File up one long edge true, mark out, cut and file to shape. Clean up and polish the

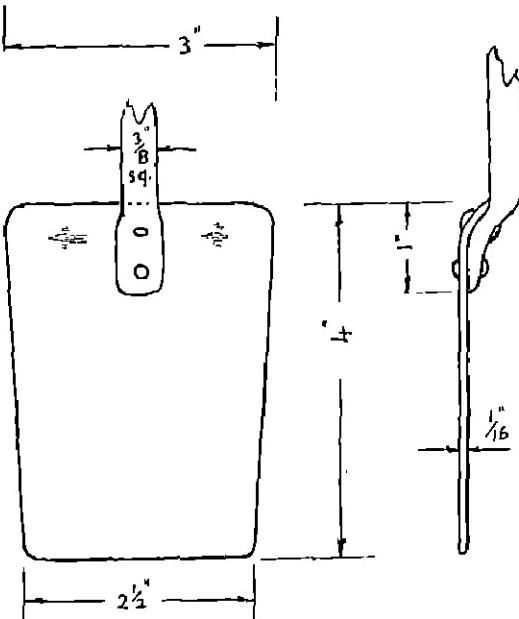


FIG. 28. WORKING DRAWING OF SHOVEL FOR HEARTH SET

surfaces and edges. Bend to shape on a suitable former and so that the stem already bent fits well down. Drill holes in both pieces, as previously explained, and rivet together. Clean up and colour if desired.

6. TONGS

A working drawing of these is shown in Fig. 29.

Materials required.

Cross piece.—1 piece B.D.S. $4\frac{1}{2}$ in. $\times \frac{3}{8}$ in. $\times \frac{3}{8}$ in. sq.

Legs.—2 pieces B.D.S. $11\frac{1}{2}$ in. $\times \frac{3}{8}$ in. $\times \frac{3}{8}$ in. sq.

Grips.—1 piece B.D.S. $2\frac{1}{4}$ in. $\times 1\frac{1}{8}$ in. $\times \frac{1}{8}$ in.

Procedure.—The cross piece may be made in one of two ways, either by drawing down the ends out of $\frac{3}{8}$ in. wide stock, leaving the round boss, or by "jumping up" or "upsetting" the wide part in the centre of $\frac{3}{8}$ in. square stock. The first method necessitates fullering down with top and bottom fullers to make two necks in the metal, and then drawing down the ends in the usual way. The second method needs rather more explanation. It is possible to produce an increase in size in a piece of metal by heating and hammering, and this is called "upsetting" or "jumping up." In the present case, if the metal is heated in the centre and held with one end on the anvil while the other end is struck with the hammer, an increase in thickness will take place. This will be noticeable in both thickness and width and it will be necessary to restrict the swelling to one direction by flattening two opposite sides. The secrets of success for this method are localised heat and blows struck directly along the axis of the metal. The first is best obtained by heating rather more of the length than necessary and cooling the ends down in water; the second by seeing that the metal is held absolutely vertical on the anvil and that the blows are direct and not glancing.

Having produced the necessary bulk of metal, or perhaps rather more, the shaping may be improved with the aid of top and bottom fullers. Whatever method is used, the forging should be well done so that the filing is reduced to a minimum. File up all over and mark out. Some help with the production of the open slots at the ends may be valuable; this type of slot is often required.

The best procedure after marking out is as follows:

Drill a hole through the metal, nearly at the bottom of the slot, with a drill slightly smaller than the required width. Next make two saw cuts just inside the lines down into the hole; this removes the bulk of the metal and the finishing can now be done with a warding or other thin file. The other part of the joint is easily produced by sawing away the waste after marking out and filing to fit the slot. It is advisable to make minor adjustments to both pieces as the fitting nears completion, so that an accurate fit can be made, at the same time keeping the joint central. It must be flush on all sides when finished; if much adjustment has to be made to the outside surfaces, the thickness of the metal is reduced and this is undesirable.

It should be noted that one leg of the tongs only is to be capable of movement, the other is riveted solid and this gives minor differences in construction. The grips are made by first marking out and drilling while in the rough shape—they are much easier to hold now—and afterwards filing to shape. Clean up and finish. The three grips may be produced by driving the metal into the gap produced by opening the vice jaws about $\frac{3}{16}$ in. The metal is now allowed to lie on the top of the vice jaws with the desired position over the gap and a blunt cold chisel used as a punch; a little practice will show what can be done. The legs should now be bent to the required slope. It may be a good plan to draw out this shape to full size on a piece of metal and compare the legs with this as bending proceeds. They must

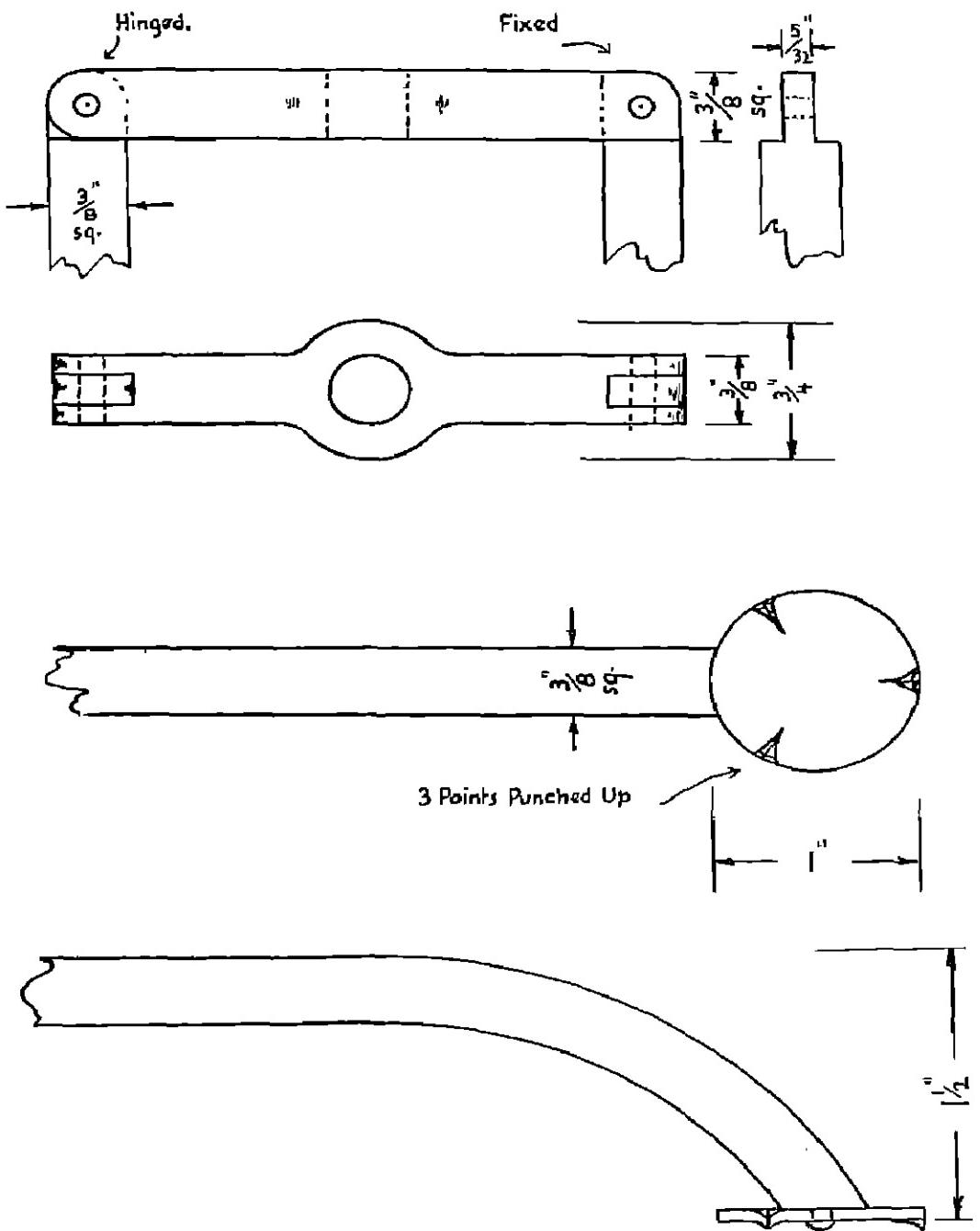


FIG. 29. WORKING DRAWING OF TONGS FOR HEARTH SET

both be alike and the actual bending can be done cold. Cut off to the required length, allowing for rivet; this can also be best decided from the full sized template. The rivets for holding the grips have to be made

by filing; this is a rather difficult operation but can be done if care is taken. All parts should now be finally cleaned up and fitted together. As already mentioned, the handle may be either screwed or riveted in position.

CONCLUSION

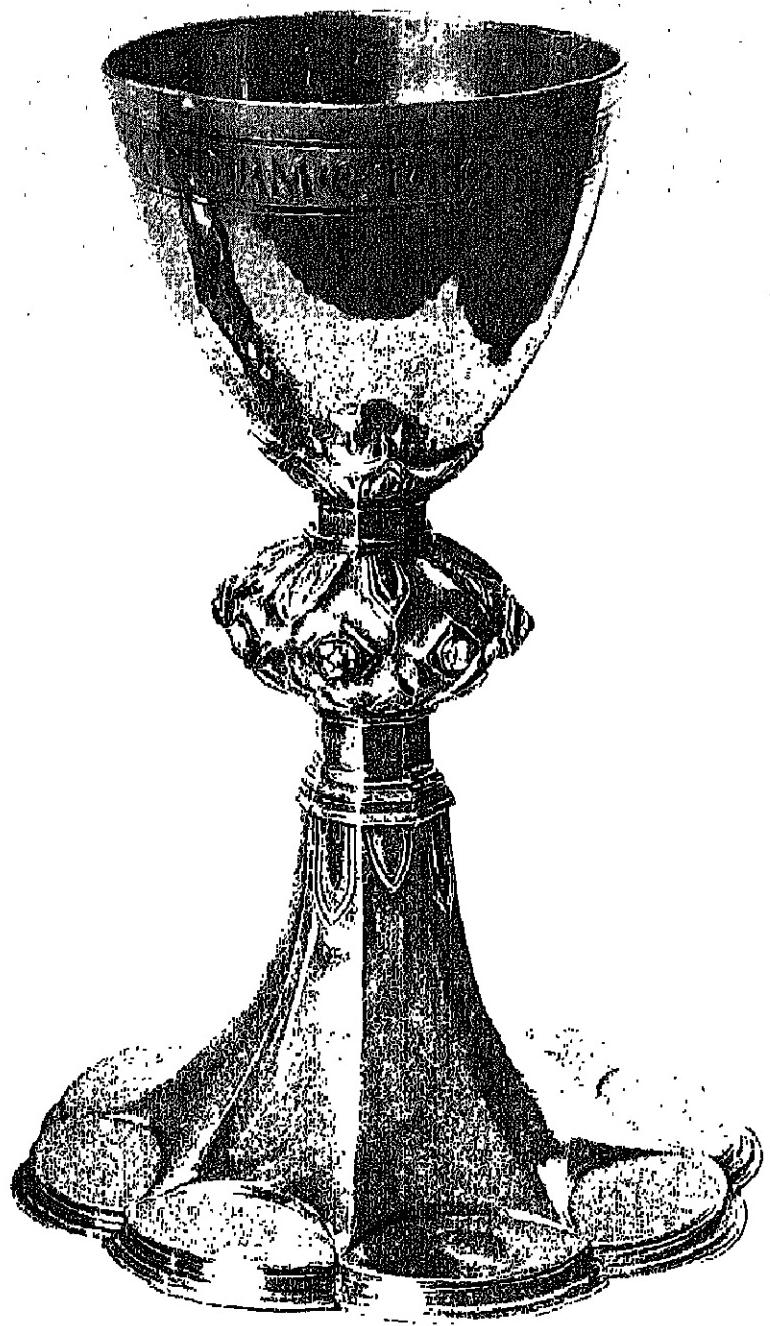
IN concluding, it is necessary to reiterate the general remarks made at the introduction to the subject. Formal metal-work and decorative metalwork should be done side by side if the teacher is capable of undertaking the work. It may be a good plan to select one piece of work from each section—and dividing the class into two parts; let each part carry out both pieces of work in turn. It may be in some cases desirable to subdivide the class still further, working in smaller groups allow the boys to work in rota through a series of set exercises. For instance, in a class of twenty boys, four groups may be working on four separate exercises; say, filing, forging, marking out and drilling, or an art metal work process, all groups carrying out all four exercises in turn. At all times throughout the course the teacher must, as the need arises, be prepared to set disciplinary exercises to introduce a new operation. The purpose of the disciplinary exercise is to prevent the work from becoming slack and to check the time factor which should not be entirely overlooked. These exercises should be done by all the boys who need them, the teacher demonstrating methods to the class as a whole. Apart from this, the work, except in the early stages, should be individual.

Caution should be used when the teacher thinks a boy should repeat some previously worked operation. Response will often be lacking if a boy is told that his work is bad. In cases where a satisfactory result is not obtained, a boy should be given another job similar, but new to him, rather than

repeat the work at which he has failed. Boys often dislike repeating work which other boys have performed more successfully, so much so that the second attempt is often worse than the first. If an entirely new or more difficult operation enters into a piece of work otherwise within the boy's capabilities, he should be shown where the difficulty lies and be advised to practice the new or difficult parts on a piece of scrap metal before undertaking the job proper. In this case the teacher should demonstrate the methods to any group of the class likely to benefit. If these methods are carefully and sympathetically applied boys soon learn to see the wisdom behind them and will often suggest themselves that they should make a trial first.

It is not intended that all boys should work through the whole of the scheme as set down, but rather that the teacher should select suitable articles from those shown to meet the needs of the individual and at the same time work along progressive lines. A good standard of work should be insisted upon from the outset; boys will soon set their own standard, which if well guided from the start will be a high one. As a guide, the teacher should consider that the standard is satisfactory if he can honestly say that he would be prepared to take for his own use, and for its intended purpose, any piece of work that he allows his boys to take from the workshop. If the work does not pass this test, the standard is low. The teacher will, from time to time, design and try out new and different articles for inclusion in the scheme, but at all times avoiding the gimcrack jobs so often seen in schools.

DECORATIVE METALWORK FOR SENIOR SCHOOLS



CHALICE IN SILVER

INTRODUCTION

IN the preparation of these chapters, consideration has been taken of such accommodation, facilities, and equipment as are generally available in central and senior schools.

The importance of manual activities in these schools is now fully recognised, and there is a salutary tendency towards the employment of specialist teachers who have some measure of ability and experience as practitioners. As a result the standard of handicraft studies may be appreciably raised.

It is obvious that if decorative metalwork is to be taught successfully, the teacher must himself possess a practical knowledge of the subject; nothing more can be expected of him beyond framing his course according to his own knowledge.

Aim.—The teacher of decorative metal-work must be clear as to the ends towards which he will be guiding his pupils. Such ends may vary from school to school and from pupil to pupil. Broadly, they must be set down as follows:—

1. He has to supply a worthy stimulus to the pupil's natural impulse to make things; develop his imagination, and instil a sound understanding of what is good, bad and indifferent in the things he sees and handles in daily life.

2. The teacher must guide the pupil to make things worthily and in obedience to the two great laws of construction—fitness for purpose and beauty of design.

3. . . . "It has often been pointed out, and with considerable reason, that many children benefit from handicraft lessons who have not hitherto made any very noticeable progress in the ordinary school work, and it has been found that the added self-respect due to ability in handicraft has led to more interest and effort in other

branches of the school work. Again, it is beyond doubt that pupils who are nearing the time when they are to leave school and go out into the world of commerce or industry take much keener interest in those parts of their work which appeal to them as having a close and immediate connection with real life than in the more academic aspect of the work, which should be closely linked up with the courses in drawing and applied art. Numerous opportunities will offer themselves for showing the pupils that articles in common use, such as household furniture, need not necessarily be ugly because they are designed for practical purposes. In this way much might be done gradually to raise the level of taste in matters of household decoration throughout the country."¹

The aim of manual training should be to foster and develop the pupil's power of adjustment to his physical and social surroundings—in short, to be a means of general culture. The object should not be confined to an immediate mastery of technique, but should open out possibilities, thus exploring the fields of ideas and emotions which occupy the minds of every normal child.

Fitness for purpose.—The two factors—the aim, and the fitness for purpose—should be inseparable in a true work of art. By fitness for purpose we mean that an article should fulfil all the requirements for which it is intended, and be made in the most suitable material. For instance, a teapot should be so designed that it can be easily cleaned. The spout must pour well and not drip; the handle must be shaped so that it can be held comfortably; the teapot must not be too heavy. Similarly, a drinking vessel should have its lip curved outwards and not inwards.

If a piece of fine metalwork is closely studied it will gradually be found that the

¹ *The Education of the Adolescent*—Board of Education Report.

craftsman has realised the importance of a first-hand knowledge of the working properties of his materials, thus resulting in a proper and natural adaptation of his ideas. To impart to his pupils in a perfectly logical and sound way this sympathy with, as it were, an understanding of his materials is surely one of the chief aims of any teacher. The boys will then have learned a most valuable part of their training. It is not for the teacher to demand an impossible reaction of the material to his own unwarranted requirements—this will only end in disobedience—but he must be prepared to allow such material to demand of him an unabused use and treatment. "The craftsman asserts that there is a stimulus in the material that he handles; its properties inspire him to right treatment; its colours persuade him to right blending; its texture or surface leads him to the right finish. The child in the school is capable of responding to this stimulus." For instance, a blacksmith would not forge out brass horseshoes because brass does not lend itself to the process of forging. In the same way, to hand-raise an object in iron would be absurd because the hardness of the metal would rebel. Again, a brass candlestick would be more easily made if its parts were cast and turned rather than raised by hand as brass is an excellent metal for this treatment. Sensitive and "softer" forms are more suited to copper and silver because of their malleability.

Beauty of design.—Much has been said of the merits and defects of design in relation to crafts. The tendency to-day is towards a timidly restricted use of ornament, if not, indeed, to the complete absence of it. For an ill considered lavishness we exchange a depressing bareness.

Surely no one would support the theory that because an object is made well and "does its job" it is necessarily beautiful. A chair may be strong, comfortable to sit on, not too heavy to be moved about, and yet be absolutely devoid of aesthetic qualities.

Surely the theories and principles generally accepted as underlying good form and proportion apply with varying degree to all objects.

The term "applied art" is often interpreted wrongly as meaning something superficial and alien; something which is merely attached to a piece of craftwork, but the decoration should be an essential element of the article itself. The things we make for our daily purpose should also add grace to our person, to our homes, and to all our surroundings. Such was the message of Ruskin, Morris and Lethaby, and teachers of handicraft are privileged to help in the advancing of this ideal.

. . . "Every work of art shows that it was made by a human being for a human being. Art is the humanity put into workmanship; the rest is slavery. The difference between a man-made work and a commercially-made work is like the difference between a gem and paste. We may not be able to see the difference at first, but, when we find out, the intrinsic worth of the one is self-evident. . . . Although a machine-made thing can never be a work of art in the proper sense, there is no reason why it should not be good in a secondary order—shapely, smooth, strong, well-fitting, useful, in fact like a machine itself. Machine-work should show quite frankly that it is the child of the machine; it is the pretence and subterfuge of most machine-made things which make them disgusting."¹

There is some difference of opinion as to whether design can be taught successfully without any direct or immediate application to craft. The writer firmly believes that a vital grasp of the principles of design can be obtained only when considered in relation to a given material and the handling of it. All the elements of design—function, form and economy—form an organic whole. The design should grow out of the material and be consonant with its qualities and characteristics.

Since we shall be dealing with boys

¹ *Form in Nature*—W. R. Lethaby.

between the ages of eleven and fourteen years, it would be unwise to allow them to attempt work which is beyond their powers of appreciation and accomplishment. A limited equipment is suggested for this reason; there would be less danger of a pupil finding himself making something too difficult. Simplicity should be the keynote of our teaching. Not only in decorative metalwork, but in all craftwork we should strive for the making of useful, pleasing objects; things we can live with, however unpretentious. To look at and handle whatever we have made day after day without losing interest in its shape or design is surely a sound test of what is good or bad. This virtue of graceful simplicity would be absent in the work of a boy who is asked to make an object altogether beyond his skill and understanding. This is the danger where exhibition work is concerned. A teacher can be so anxious to produce a show for exhibitions that his demands on the class as a whole are far above its powers. Furthermore, such undesirable difficulty in the object the boy is making unduly taxes the energies and resources of the teacher who is too frequently called upon to remedy mistakes which are bound to occur.

Education for the consumer.—Whereas few pupils will make their living by means of decorative metalwork, all of them stand in urgent need of education as "consumers." They must be furnished with sound criteria so that they may later buy with discernment and with first-hand recognition of what is appropriate and lovely. As the work of the individual craftsman is beyond the purchasing power of the general public, machine made goods subsequently flood the market. We thus find a divorce taking place between design and industry. Nevertheless, if only the machine were governed by the requirements of an aesthetically enlightened public, there is no reason why the product of the machine should not be beautiful. As things are, the manufacturer complains that the quality of his out-

put is determined by the demands of the purchaser. This may be perfectly true and in order that a happier relationship and understanding should exist between the consumer and manufacturer, much could be done by teachers of handicraft in elementary schools to ensure that, when the time comes for their pupils to leave school, they will be the means, as a result of an appreciative mind, of inducing the manufacturers to produce better articles of everyday use.

"As the standard of articles produced in the United Kingdom depends on the education, training, and opportunity given to designers on the general level of appreciation—or in other words of demand—of manufacturers, buyers, salesmen, and of the consuming public, and on the co-operation of Industry with Art, it follows that the question of the education provided in the art and trade schools and also in public secondary, and elementary schools, both in the direction of creative artistic work and of appreciation, is of fundamental importance to artistic production in industry.

"We are accordingly of opinion that art and craft education is a subject which requires the constant attention of teachers and educational administrations, and we feel sure that those responsible will find it necessary to consider such fundamental problems, for example, as the quality of the art teaching in the schools and the training and method of employment of teachers. It is common knowledge, we believe, that co-operation between Industry and schools is not always as close as it should be, and we feel that much remains to be done in order that the teachers and students in these schools may have a clear conception of the requirements of industry, and that industrialists may have first-hand knowledge of the schools. It is probably true to say that, for one person who visits a museum or gallery, a thousand enter a shop to buy a cup and saucer; hence the immense importance of giving a right direction to the taste of boys and girls while they are still at school is evident, and we hope that the

problem will be faced in the public, secondary and elementary schools of making the understanding and enjoyment of beautiful things an essential part of the day-to-day life of the school. We are impressed by the freshness, spontaneity and inventiveness of young children in the matter of design, and with the result that can be obtained by training and developing these faculties under a sympathetic and understanding teacher. We feel that here is an almost unworked source of designing capacity, which might be of service to industrial art."¹

Drawing and appreciation.—Drawing is an important preliminary in decorative metal-work, and our pupils should have reached a fair standard in expressing their ideas on paper. Too much emphasis can, however, be laid on the making of detailed drawings during the early stages of construction. As long as the drawing affords a means of reasonably guiding the pupil in the actual making of an object, this is, for our purposes, sufficient. If a pupil finds that in the course of making something, he can improve on the original design, then he should be permitted to depart from it. After all, the tools with which he is working are bound to influence the shape. This often occurs in the process of hand-raising where it is practically impossible to adhere strictly to a drawn shape because of the limitations of the stake. If a fine curve shapes itself during this operation, let it remain at that, and if necessary, the drawing can be altered. This is where the machine-made article lacks that element of individuality. When, of course, we come to consider constructional details and decoration, we must be sure that our drawings of these parts are made accurately and to the proper size.

All craft pupils should be encouraged to study in their spare time—or in school if necessary—any natural forms which may have a direct bearing on their craft. We can do little better than go to nature for our

inspirations and the uplifting of our appreciation. Decorative and beautiful forms are ever present in such things as trees, flowers, fruit, fishes and shells, but their beauty means nothing to us unless we search diligently for it. We may admire a fine strong oak tree but until we inspect closely the growth of its branches and the grouping of its leaves and acorns we shall have missed a great deal of its message to us. "Perfection is made up of trifles, but perfection is no trifle."

Much would be learned if pupils were given a lesson in drawing these natural forms; their minds would respond gradually to the realisation of beauty of shape and subtlety of form. Their drawings, at first, will be very realistic—in other words a mere copy of what they see and nothing more; there will be no attempt at a decorative or conventional treatment which is what is desired. Get them to simplify and reduce their drawings to a minimum number of lines, and they will by degrees begin to study nature in terms of "pattern" or "decoration." Incidentally, their drawings will become more "solid"—yet sympathetic—and more fitting to a rigid material such as metal. Drawings, too, of common objects in perspective based on square and cylindrical forms are exceedingly helpful in enabling pupils to visualise their metalwork in all three dimensions as distinct from plan and elevation.

Summary.—On the whole, then, the end is not so much to prepare expert craftsmen as to provide an expressive outlook to a strong and vital constructive impulse in the adolescent; to introduce more healthful joy in our scheme of decoration; and to furnish our pupils with sound criteria, with more reliable means of distinguishing between good and bad in matters of art and craft; in short, to "educate the consumer" so that streets, houses and rooms of the future may be increasingly dignified and beautiful.

¹ *Art and Industry*—Board of Trade Report, 1932.

THE WORKROOM

Equipment.—As equipment, tools and materials play an important part in decorative metalwork, the type of work must be governed by such as are in possession. Some schools may be more fortunate in this respect than others, but it is surprising what can be achieved with a few tools. We have only to study the admirable work produced by the guilds of mediaeval times to realise this. Necessity is, and always has been, the mother of invention—what tools these craftsmen of old lacked were improvised by ingenious means. No one would doubt that the old craft work possessed a charm—very probably due to these limitations—which is not commonly to be found in work of to-day. A somewhat meagre equipment may, therefore, be a blessing in disguise; it would compel us to aim at simplicity rather than that ill considered elaboration which must be discouraged at all costs.

A well-lighted room is absolutely necessary if the best results are to be obtained. It does not matter if the room in which the work is done is not built specially for the craft as long as the furnishing of it is done to the best advantage, Plate I, Fig. 1.

Benches.—These should be fixed securely to the floor by any means possible. They should be about 5 ft. apart. Obviously, the best position for them is near the window. A wall bench is practicable in most school-rooms running perhaps the whole length of the room; this is ideal from the point of view of light. The height of a bench should be roughly 2 ft. 9 in. and about 7 ft. 6 in. long by 2 ft. 6 in. wide, Fig. 2. A couple of drawers fitted to each side of the bench are useful for putting in tools for general use such as mallets, files, pliers, tongs and shears; tools which are used almost constantly. Hammers—particularly the planishing and raising

kinds—should never be placed loosely in a drawer or cupboard since, in time, their faces would be scratched and bruised. A good plan is to provide a shelf in which are drilled a number of circular holes sufficiently large to take the handles; or a couple of nails partly driven into the side of a cupboard about 1 in. apart from which to suspend the hammer would serve the purpose. Benches should have tops made of strong hard wood such as beech or elm at least 2 in. thick, to the edges of which jeweller's pegs can be fixed—two on either side are sufficient, Fig. 3. These are necessary for filing and saw-piercing work. The legs of a bench, usually six in number for the size given above should be 3 in. square in section and be strengthened by crosspieces of the same thickness or perhaps a trifle less.

Vices.—These should be as heavy as possible of the "leg" type, and must be fitted to the bench immediately above each leg and also to the bench leg. If the vice leg is long enough extra stability can be gained by letting it into a wood block screwed to the floor. A parallel vice can, of course, be used instead but the other is preferable.

Stools.—A uniform height for stools is not recommended since boys vary considerably in height themselves. They should range from 1 ft. 6 in. to 1 ft. 9 in. Footstools are useful for very small boys to stand upon when engaged in work on a tall stake where plenty of arm length is needed.

Soldering hearth.—This is really a bench 2 ft. 6 in. high fitted to the wall and covered with sheet iron to prevent the top getting burned and to enable us to place on it anything hot. To this is fixed an iron revolving tray—two if possible—1 ft. 6 in. in diameter and 3 in. deep, for annealing and soldering work. A fixed trap is not at

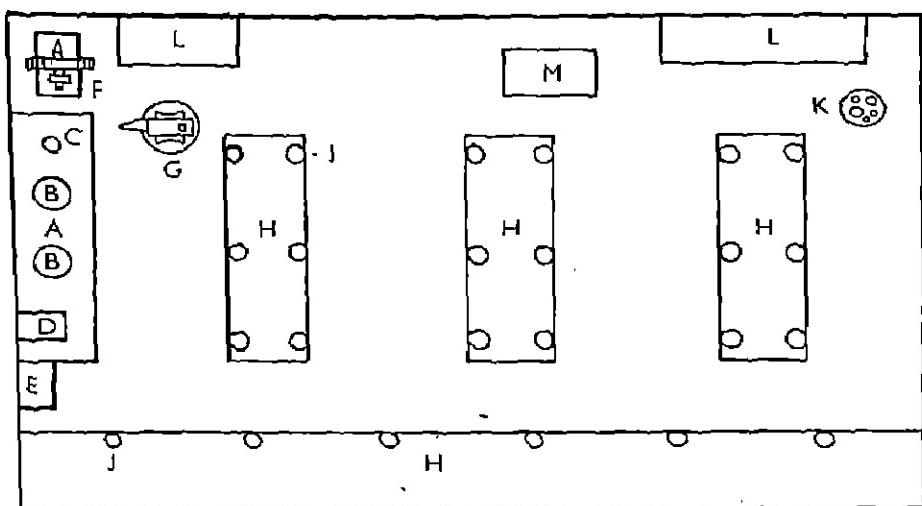


Fig. 1 A suggested plan for a workroom

A, Hearth. B, Soldering trays. C, Gas ring. D, Pickle vat. E, Sink. F, Lathe.
G, Anvil. H, Benches J, Vices. K, Doming Block. L, Cupboards M, Showcase.

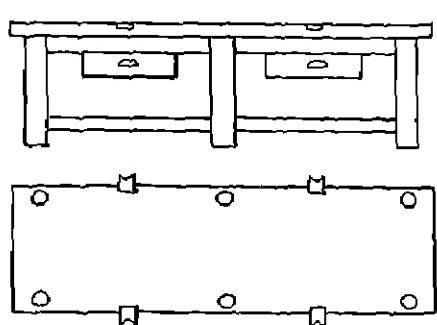


Fig. 2 Plan and elevation of a bench

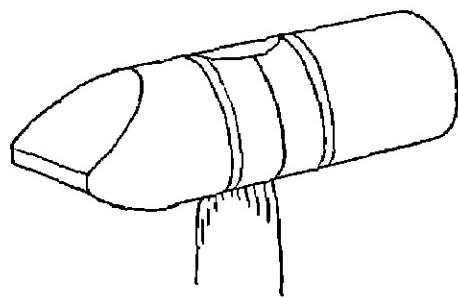


Fig. 4 A raising mallet

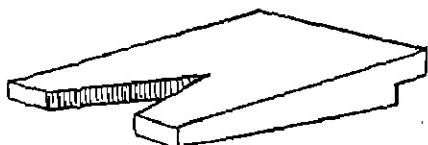


Fig. 3 A jeweller's peg



Fig. 5 Pitch bowl and collar

PLATE I.—THE WORKROOM AND ITS EQUIPMENT

all suitable as it must be possible to turn the work round to ensure even annealing and, incidentally, make the soldering easier. Into this tray coke is put—it must be perfectly clean and broken up into small pieces of about 1 in. or $1\frac{1}{2}$ in. This retains heat and affords a means of support for the work.

Firebrick.—If our work demands a perfectly flat foundation, a firebrick is necessary. A 12 in. square one is suitable if grooved on one side.

Blowpipe and bellow.—A most important appliance for annealing and soldering. Choice can be made from several types—there is a Birmingham pattern which is very good. A $\frac{1}{2}$ in. gas supply is the usual size.

Acid vat.—Lead vat for containing diluted sulphuric acid for pickling (cleaning). Used hot and heated by a gas ring underneath. This acid can be used cold but the action is much slower.

Gas ring.—An extra one fitted to the hearth over which is suspended an iron pitch pot to contain pitch for chasing.

Sink.—This must be as near to the acid vat as possible so that work which has been pickled can be immediately immersed in cold water.

Lathe.—A foot or power lathe $2\frac{1}{2}$ in. centre or over.

Grindstone.—Not essential.

Anvil.—For heavy work and forging.

Doming block.—A section of a treetrunk of not too hard a wood out of which are gouged a number of circular depressions of varying diameters and depth for hollowing or sinking bowls, etc., in their initial stages.

Sandbag.—Also for doming.

Cupboards.—For general storage of tools and work.

Showcase.—A pure luxury in regard to equipment but useful for displaying finished work.

Scrapbox.—Any kind of box into which can be put odd bits of metal.

Tools.—Many tools can be made from odd pieces of iron and answer the purpose of ready-made and expensive ones. At some

time or other it may be necessary to alter the shape of a stake or head. This is permissible within reason but to do this too often will be regretted as we shall need the original tool probably later on. It is much safer to think ahead of the tools we shall need and to work out our designs accordingly. Each tool gives to a piece of work its own particular quality of form and surface, and to aim for something which we know the tool cannot give is entirely wrong. Our pupils should therefore be taught to understand and estimate this response of metal to tool.

Stakes and heads.—These are made of malleable cast iron and can be had ready-made or cast from wood patterns. It is most important that a special rack be provided for them in the workroom. They should be placed on this rack without touching each other thus keeping them free from scratches and blemishes. Constant polishing by filing and emery-clothing is essential as so much depends on their smooth surfaces, particularly in planishing.

Raising stake.—Double-ended, Pl. II, Fig. 1. Perhaps the most useful of all raising stakes. The rounded end is used for convex forms, and the cylindrical end for straight and concave forms.

Raising stake.—Double-ended, Pl. II, Fig. 2, for smaller raising.

Cow's tongue.—Another raising stake, Pl. III, Fig. 5.

Funnel stake.—Serves many purposes. Useful for straight-sided vessels, Pl. II, Fig. 7.

Throwback stake.—For throwing out the necks of vessels, Pl. III, Fig. 4.

Beck-iron.—A very useful stake, Pl. III, Fig. 1.

Mandrel.—A circular tapering stake for making rings and vessels from $\frac{3}{8}$ in. to $4\frac{1}{2}$ in. diameter perfectly round, Pl. III, Fig. 2.

Mushroom stake.—For deep vessels, Pl. III, Fig. 7.

Raising head.—For early stages in raising, Pl. I, Fig. 3.

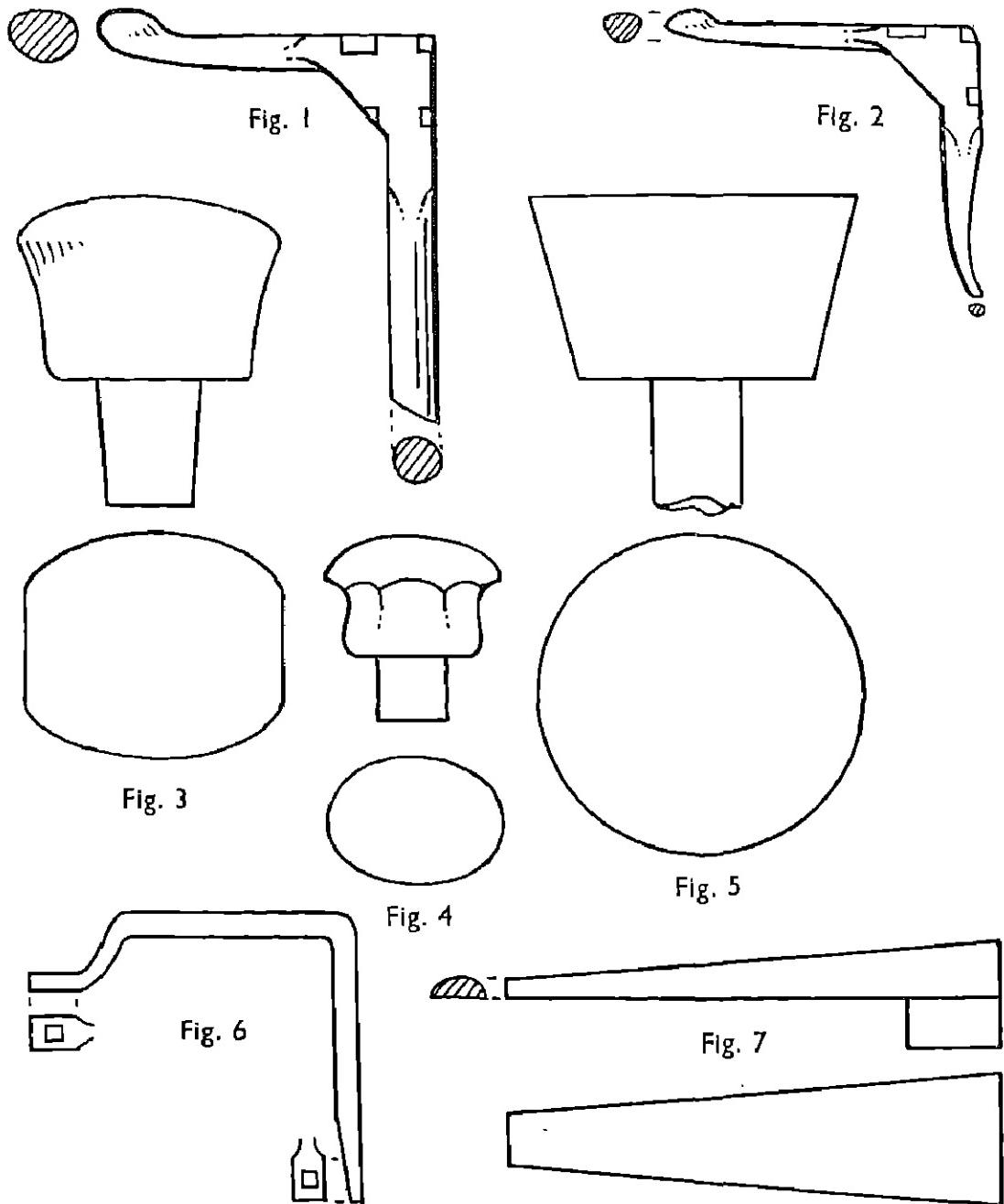


PLATE II.—STAKES AND HEADS FOR DECORATIVE METALWORK

Fig. 1. Double ended raising stake. Fig. 2. Another raising stake. Fig. 3. Raising head. Fig. 4. Raising head. Fig. 5. Bottom stake. Fig. 6. Crank. Fig. 7. Funnel stake.

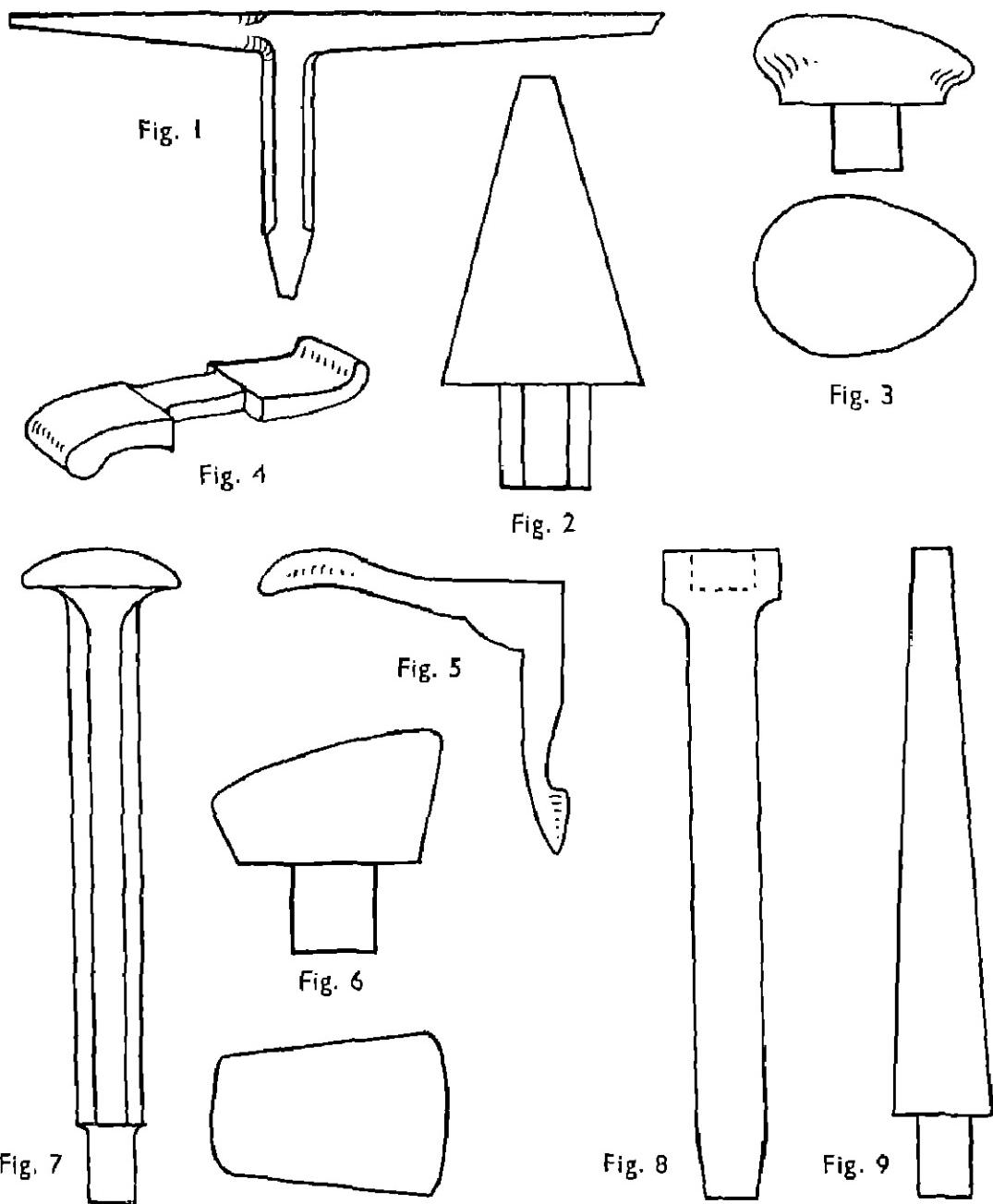


PLATE III.—STAKES AND HEADS (CONTINUED)

Fig. 1. Deck-iron. Fig. 2. Mandrel. Fig. 3. Raising head. Fig. 4. Throwback-stake. Fig. 5. Cow's tongue. Fig. 6. Raising head. Fig. 7. Mushroom-stake. Fig. 8. Straight-stake holder. Fig. 9. Triplet.

Raising heads.—Shanks are $\frac{3}{4}$ in. square, Pl. II, Fig. 4 and Pl. III, Figs. 3 and 6.

Bottom stake.—For deep vessels, Pl. II, Fig. 5.

Horse or crank.—For holding heads, Pl. II, Fig. 6. $\frac{3}{4}$ in. holes.

Straight stake holder.—For holding heads for deep vessels.

Triblet.—A tapering iron rod 14 in. long, Pl. III, Fig. 9.

Surface plate or flat die.—12 in. square by 1 in. thick.

Hammers and mallets.—It is difficult and unwise to limit the number of hammers since the hammer is probably used more than any other tool in metalwork. A certain contour in metal requires a hammer best suited to its shape, so do not spoil the work by trying to make do with one instead of several. Plate IV shows plans and elevations of nine hammers all of which will be required in the following lessons. They are between 4 and 6 oz. in weight with the exception of one or two larger ones.

Several mallets are necessary—2 in. diameter is the most useful size though a larger one is desirable at times. Boxwood is the best material—hard and close grained. Hide ones are quite good. Take the precaution of well rounding the edges of one end before using, otherwise they will chip and splinter. The other end we shall saw to a wedge shape for raising purposes, Pl. I, Fig. 4.

Files.—These are obtainable in the following sections:—

Flat.—10 in. second cut (one edge smooth); 10 in. smooth (one edge smooth); 6 in. second cut; 6 in. smooth.

Half-round.—6 in. second cut; 6 in. smooth.

Round.—8 in. smooth.

Triangular.—6 in. smooth.

Warding.—4 in. smooth.

Needle files.—Very small files, rough and smooth, without handles are necessary. Can be had 14 and 16 cen. sizes.

Other tools.

Shears.—10 in. straight; 8 in. curved; 6 in. jeweller's (small).

Saws.—Hacksaw and blades; jeweller's back saw, 9 in.; piercing saw frame with round-back blades of different sizes from No. 1 to No. 4.

Hand drill-stock.—To take drills up to $\frac{1}{4}$ in. A drilling machine would be a great help.

Stock and dies.—For screwing.

Pliers.—5 in. flat-nosed; 5 in. half-round.

Hand vice.—2 in.

Tongs.—Large draw tongs for wire drawing. Iron tongs (9 in.) for soldering. Copper tongs for pickling. Corn tongs.

Binding wire.—A soft iron wire, 18, 20 and 22 S.W.G.

Draw plates.—With holes of various shapes for wire drawing.

Measuring tools.—Steel rule 12 in.; "Stanley" square 12 in.

Dividers.—3, 5 and 7 in. sizes.

Pencil compasses.—An ordinary pair.

Scribing block.

Standard wire gauge.

Chasing appliances.

Pitch pot and ladle.

Pitch bowel and collar. Pl. I, Fig. 5.

Pitch block.—Pieces of wood 9 in. square for holding pitch for chasing.

Pitch.—Best Swedish pitch is advisable. Plaster of Paris and tallow must be added to make the correct consistency.

Pitch ladle.—For pouring pitch into bowls, etc.

Polishing materials.

Black bristle brushes.

Mops.—Used for final polishing. Made of calico or linen.

Emery cloth.—Coarse, medium, and smooth.

Water-of-Ayr stone.—A kind of slate for removing scratches.

Powdered pumice.—This, mixed with oil and used on a bristle brush, is excellent for polishing.

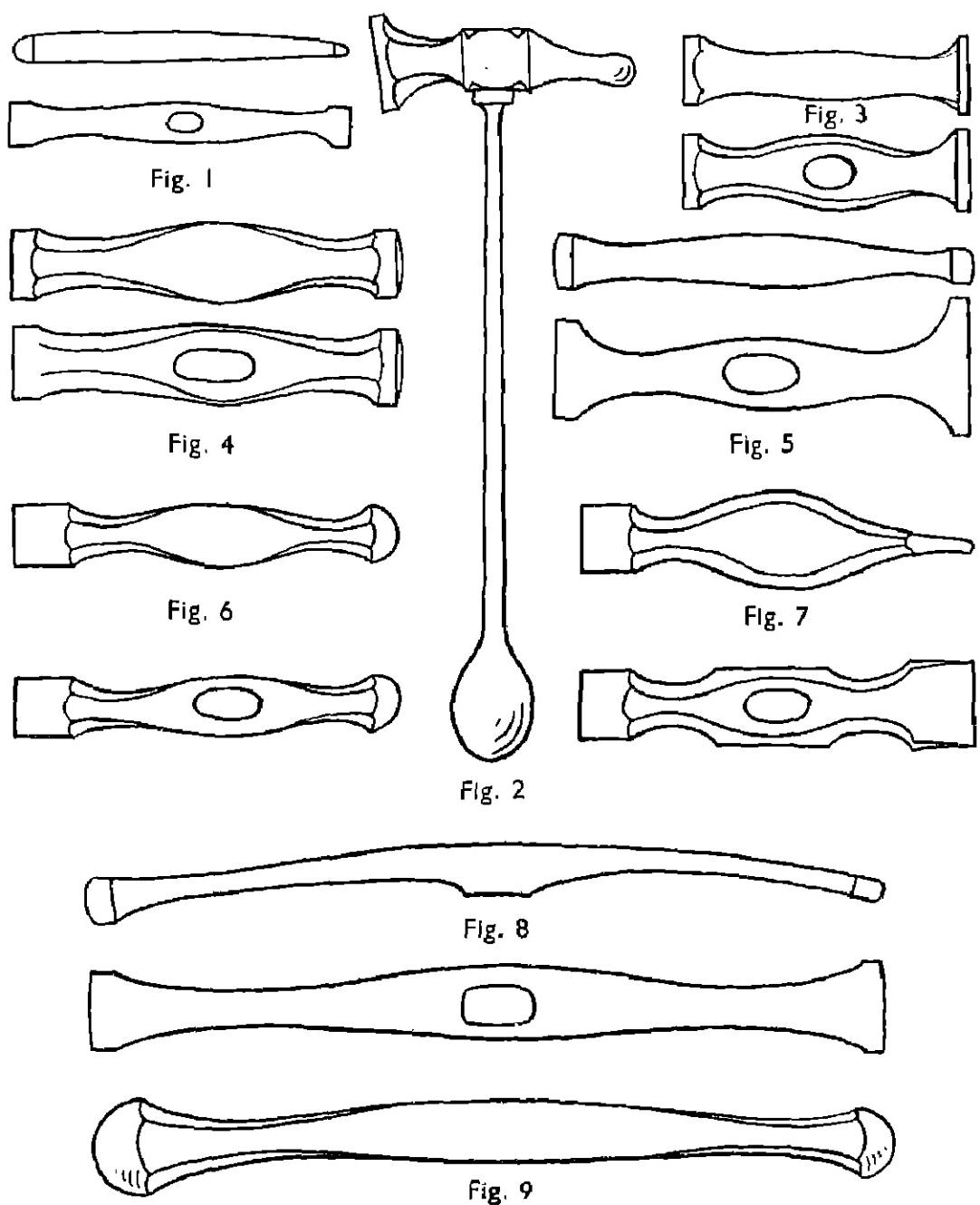


PLATE IV.—HAMMERS FOR DECORATIVE METALWORK

Fig. 1. Collet hammer. Fig. 2. Chasing hammer. Fig. 3. Plumb-long hammer. Fig. 4. Large planishing hammer. Fig. 5. Neck hammer. Fig. 6. Ball-pane hammer. Fig. 7. Pane hammer. Fig. 8. Long neck hammer. Fig. 9. Droning hammer.

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Tripoli.—A composition containing grease. Rubbed on to a mop for final polishing.

Chemicals.

Sulphuric acid for the pickle vat. Can be used hot or cold—preferably hot as the action is quicker—and diluted. If hot, 1 part acid to 20 or 30 parts water. If cold, 1 part acid to 10 parts water.

Nitric acid.—Useful for “dipping” brass, thus removing oxide of copper.

Liver of sulphur.—Dissolved in hot water and used for darkening (colouring) silver, copper and gilding metal.

Borax.—A flux for hard soldering. Either the powdered form or the lump may be used.

Borax brush.—A small camel hair brush.

Metals and solders.—A detailed metallurgical survey of metals and alloys is unnecessary for the purpose for which these chapters are intended, and since we shall be concerned with the making of simple articles for everyday use only, and not with an intensive study of the properties and qualities of metals, the following points will be quite adequate.

Copper.—A delightful and easy metal to work in, but owing to its extreme malleability it should be used sparingly. When used in combination with other metals like silver, brass and gilding metal, the contrast in colour is very pleasant.

Gilding metal.—A kind of brass containing as much as between 80 and 90 per cent of copper. For our work it is much more practical because of its comparative hardness. Its colour is almost like that of gold when brightly polished but, unlike gold, it tarnishes rather quickly. This should be ordered “soft-rolled.”

Brass.—An alloy of copper and zinc varying between 70 per cent copper and 30 per cent zinc. It lends itself admirably to casting. The gauges we shall require in copper, gilding metal and brass are 24, 22, and 18 S.W.G. (Standard Wire Gauge). A little

extra thickness in brass would be useful— $\frac{1}{16}$ in. and $\frac{1}{8}$ in. in addition to the above.

Malleable cast iron.—Stakes and heads upon which the work is shaped and hammered are made of this metal.

Cast steel.—Contains a small percentage of carbon. The chasing and other small tools will be made of cast steel in the form of square and round rod $\frac{1}{8}$ in. to $\frac{1}{2}$ in. in thickness.

Silver solder.—An alloy of silver, copper and zinc, obtainable in three grades; (1) hardest, (2) medium, (3) easy. The harder the solder the more silver it contains and the less zinc. Sheet silver solder is suggested rather than the wire form.

Brass solder.—A solder containing 50 per cent copper and 50 per cent zinc; obtainable in sheet or wire.

Dealers.—In the past, a certain vagueness has been expressed by many teachers who have not known where to place their orders for equipment, tools, and materials. The following list of well-known dealers may be found useful.

Tools and appliances.—

Thomas Sutton, 166, Warstone Lane, Birmingham, 18.

F. Meeks and Co., 41, Warstone Lane, Birmingham, 18.

Dryad Handicrafts, St. Nicholas Street, Leicester.

Metals.—

The Hall Street Metal Rolling Co., Ltd., Weston Road, Birmingham.

Metals and solders.—

William Gabb, 92, Snow Hill, Birmingham, 4.

Westwoods, Hall Street, Birmingham.

Silver.—

Johnson, Mathey & Co., Ltd., 71, Vittoria Street, Birmingham, 1.

Edward Day, 28, Warstone Lane, Birmingham, 18.

Polishing materials.—

W. Canning and Co., Ltd., Great Hampton Street, Birmingham, 18.

COURSE OF DECORATIVE METALWORK

I. FILING A SQUARE PIECE OF METAL TRUE

Straightedge filing.—Give the pupils a piece of 20 S.W.G. gilding metal which has been roughly cut to a $1\frac{1}{2}$ in. square with a large pair of shears. Get them to file this perfectly square with a flat, rough file. Before it is possible to do this, two metal clamps are required, made from fairly thin scrap metal—any metal will do—to fit over the jaws of the vice to prevent marking the

square of metal, Fig. 1. Place these in the vice and between them the square of metal with the top edge horizontal and about $\frac{1}{2}$ in. above the top of the vice, Fig. 2. File this perfectly straight and test it by placing a steel rule along it. There will be a tendency to file more at each corner than in the centre, producing a fullness due to a rocking motion of the file which is experienced by all beginners. Flat filing comes through long practice only. The end of the file should be held lightly with the thumb and first



CORRECT POSITION FOR STRAIGHT-EDGE FILING

two fingers of the left hand, thus steadyng the file and keeping it horizontal; extra pressure is also brought to bear on the outward thrust. Remove the square of metal and with the aid of a small trysquare placed on the edge just filed, mark a line with a scriber (either bought or made) at right angles to it. Place the square of metal in the vice again and file as before, repeating this process until all four sides are straight and at right angles to one another. Emery cloth these edges until quite smooth.

Decorative filing.—We now have a perfectly square piece of metal, but it is uninteresting. Enrichment can be introduced by more filing, but this time using smaller files (needle files). The pupils' imaginative faculties can be developed here if several of these files—fairly rough ones—of different sections, say a half-round, a three-square or triangular, and a round one, are put at his disposal.

With these three files it is possible to produce an endless variety of decorative edges to the square of metal. All four edges could be differently treated in this way. Fig. 3 gives suggestions. It will be found that the files just used have left a rather rough surface, so finish with smooth ones.

TEACHING HINTS

Filing.—It is a pity to use brand new files on brass because brass has a tendency to clog them. Brass drags during this process. Providing an old file has not worn smooth it will answer the purpose. The position for filing is important. See that the pupil is high enough and that his right elbow is approximately on a level with the vice jaws. It is impossible to file a horizontal surface if the boy is handicapped in this way.

Draw on the blackboard a few much enlarged suggestions for decorative edges but allow each boy to experiment.

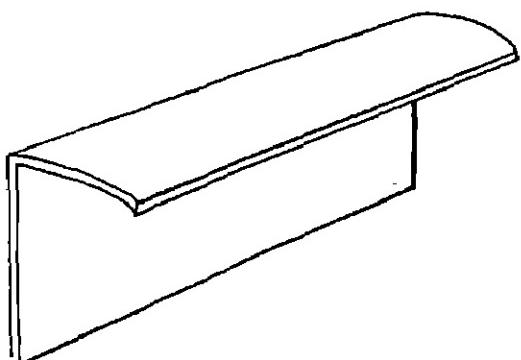


Fig. 1 A vice clamp

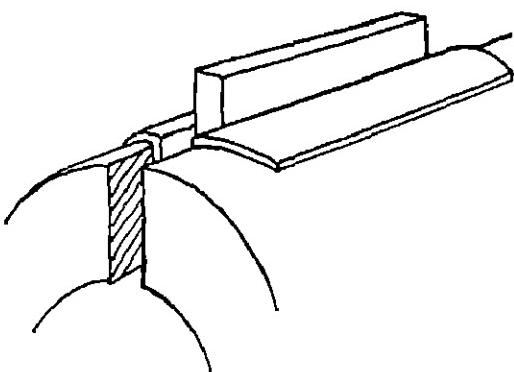


Fig. 2 Position of metal
in the vice for filing

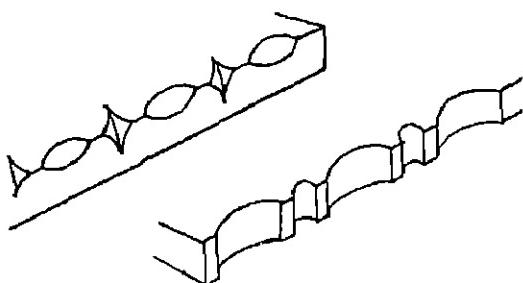


Fig. 3 Filed edges

II. KEYHOLE PLATE

Bevel filing and drilling.—In this section, in order to introduce variety into the work of the class, it would be a good idea to divide the class into a number of groups and ask each group to make a differently shaped keyhole plate. Plate V shows six designs. We will describe the making of these separately. All are cut out of $\frac{1}{8}$ in. sheet brass.

Pl. V, Fig. 1.—Some $\frac{1}{8}$ in. sheet brass will be required. This, when obtained, will be in large sheets, perhaps 12 in. wide. It is obvious that it is impossible to cut small pieces from such a large piece with a pair of shears. The metal is far too thick. The best way is to use a chisel made of $\frac{1}{2}$ in. square cast steel rod $2\frac{1}{2}$ in. long. After marking out with a scribe an oblong 2 in. by $1\frac{1}{2}$ in., place the large sheet of brass on the surface plate or flat die with a piece of scrap metal between the brass and surface plate, and proceed to chisel along the scribed lines, taking care to keep the chisel not actually on the line but a little outside. This will allow filing down to the exact size. Use a fairly heavy hammer and move the chisel after each blow, making sure that each subsequent blow touches, or even overlaps the previous one. Do not attempt to cut through the brass with one strike but go round the rectangle lightly first in case a slip is made with the chisel.

When the rectangular piece of brass is cut out it will be seen to be jagged on the edges. Place it in the vice between two clamps and file as in Section I, beginning with a second cut file and finishing with a smooth one. The edges are now ready for bevelling. Place the plate on the surface plate and, with a pair of dividers, scribe a line along each edge by allowing one point of the dividers to run along the corner between the surface plate and the vertical edge of the metal, Pl. VI, Fig. 7. Set the dividers at the distance required for scribing a line $\frac{1}{8}$ in. inside the edge of metal.

This will give us a bevel of 45° . It will be impossible to file the bevel with the plate in the vice. Fix a piece of wood in the vice horizontally so that its top edge is about 2 in. above the vice jaw. Rest the plate firmly against this edge with the left hand and, using a rough file to begin with, file almost to the scribed line, Fig. 8. Finish the bevel with a smooth file and emery cloth. Care must be taken not to round the corner of the bevel when using emery cloth. This can be obviated by wrapping a piece of emery cloth round a stick of wood rectangular in section, 9 in. long, 1 in. wide, and $\frac{1}{4}$ in. thick. Score the emery cloth with a divider point where the corners of the stick touch it to get a sharp and close fitting. Secure the emery cloth at each end with thin binding wire. This emery stick is used like a file. Smooth, medium, and rough emery sticks will be found useful.

Decorating the bevelled edge.—The bevelled edge is decorated by means of a round rough needle file finishing with a smooth one. With a scribe and dividers measure and mark at equal distances along each edge a number of divisions. It will be found difficult to use a round file on a flat surface—it will slip and mark the metal—so nick these divisions with a triangular needle file and it will be found that the round file will run along the groove. File a shallow groove first and deepen them gradually, keeping a uniform depth and width. An enlargement is shown in Fig. 9.

Drilling the holes.—The plate is now ready for drilling the keyhole. Draw a pencil line down the centre of the plate and assuming that the keyhole is $\frac{1}{4}$ in. long, space this distance centrally on the plate, and mark with the scribe. Centre-punch a position for a $\frac{1}{8}$ in. drill and scribe two more lines $\frac{1}{8}$ in. apart parallel with the centre line. This gives us a narrow rectangle $\frac{1}{8}$ in. by $\frac{1}{8}$ in. Fit in the drill-stock a $\frac{1}{8}$ in. drill. Place the plate on a piece of wood so as not to injure the bench top and drill the hole.

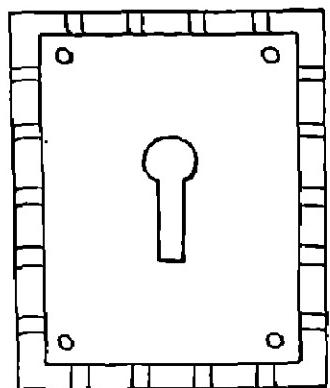


Fig. 1

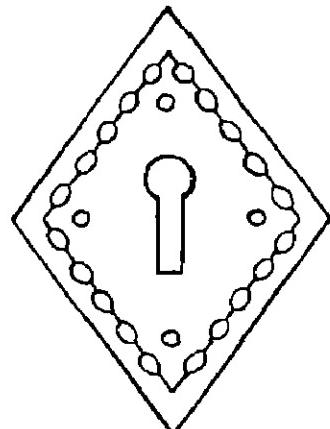


Fig. 2

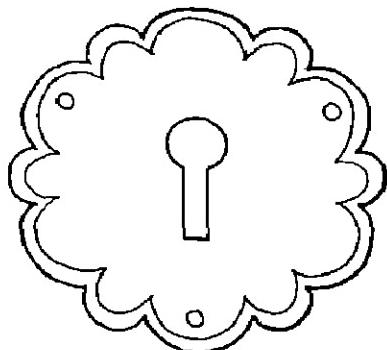


Fig. 3

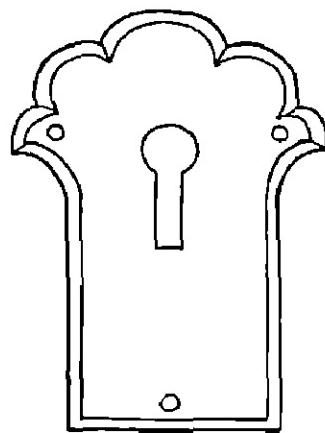


Fig. 4

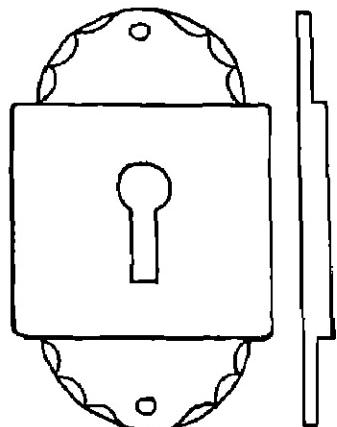


Fig. 5

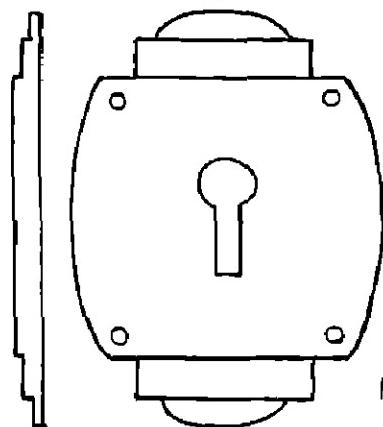


Fig. 6

PLATE V.—DESIGNS FOR KEYHOLE PLATE

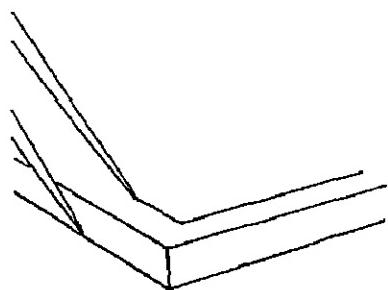


Fig. 7 Scribing a line parallel to an edge with dividers

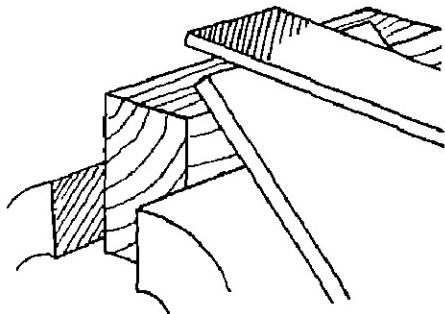


Fig. 8
Bevelling an edge



Fig. 9
Enlargement of filed edge



Fig. 10
Showing drilled holes previous to filing



Fig. 11
Detailed edge of Fig. 2



Fig. 12
Edge of Fig. 3

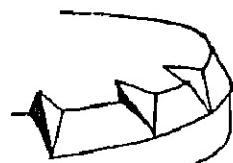


Fig. 13
Grooves filed with a three-square needle file

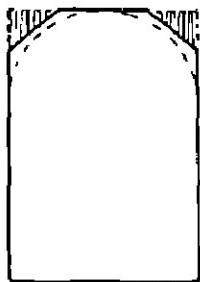


Fig. 14
Roughly shaping the semi-circle by sawing off the corners

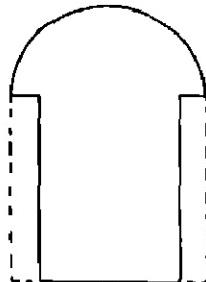


Fig. 15
Surplus metal sawn away before filing

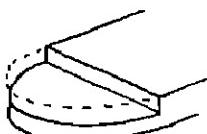


Fig. 16
Reducing the thickness by filing

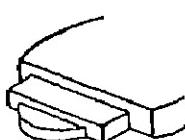


Fig. 17
Perspective view of end of plate

The plate will in all probability spin round as the drill revolves. Another pupil can usually be found to hold it in position; if not, it is possible to rest something heavy against one of its corners.

Now centre-punch along the centre line making allowances for a $\frac{1}{2}$ in. drill. It will be necessary to drill four holes with this drill so that the holes touch each other, Fig. 10. File away to the scribed line with a smooth narrow flat needle file. Drill four holes (one in each corner) with the same drill for the screws.

Polishing.—Polishing is the next process. Inspect the surface of the plate for blemishes and scratches. If there are any, it may be possible to remove them with emery cloth; but a smooth file must be used if this is ineffective. Water-of-Ayr stone—a very fine abrasive—is excellent for obtaining a smooth surface on metal. Use this by frequently dipping in water and rubbing with some pressure. Stoning, as it is called, does not impart a high polish but merely removes scratches. Beauty of metal lies in its shine or lustre and this should be the aim however laborious the process may seem. To do this put some powdered pumice (pumice powder) into a saucer or metal tray mixing with it sufficient oil—any sort—to make a thick paste. Smear this on to the plate and hold it very firmly against a revolving bristle brush on the lathe, turning it carefully in all directions. Do not put too much pressure on the bevelled edge otherwise it will be rounded. Swill in hot soap and water and dry with clean fine rag. The surface will still be dull and uninteresting until it is polished on a calico or linen mop. Rub some tripoli (a greasy compound) on to the mop which has been substituted for the brush and hold the plate against it as before. A high polish will thus be obtained.

Pl. V, Fig. 2.—The only difference between this plate and that illustrated in Fig. 1 lies in its shape and decoration. There is another method of cutting thick metal and that is

sawing by means of a hack saw. If this plate has to be cut from a large sheet of metal, it must be chiselled as before, or a rectangular piece $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in. could be sawn and then again sawn to the diamond shape required. Repeat the processes involved in Fig. 1 until the needle filing is reached.

This time the decoration is done with a half-round rough needle file after marking the positions with the triangular file. It will be seen that the shapes produced by the half-round file do not touch each other but have a space between them. File carefully until these spaces are equal and the shapes a uniform size. Finish with a smooth file as before. Drill holes, etc. Inspect surface and polish. Pl. VI, Fig. 11 shows an enlarged portion of the edge.

Pl. V, Fig. 3.—Saw or chisel out a square $1\frac{1}{2}$ in. across, then saw off the corners in the shape of an octagon. With the dividers draw the circle and file to this line as before. A different motion of the file is necessary in this exercise. A round edge is being filed and therefore the file must travel round with it in a circular direction to the right, otherwise flat sections will appear on the circumference. In short, a rocking motion takes place, but keep the file at right angles to the surface of the plate. In this exercise, the entire edge is not bevelled, but only half of it. This gives a vertical edge of $\frac{1}{16}$ in. in addition, Pl. VI, Fig. 12. Before the bevel is filed, however, the scollops must be shaped—six large ones and six small ones keeping them all at right angles to the plate. Set these out with the scriber by dividing the circumference into six equal parts. Assuming that the width of the small scollops is $\frac{1}{8}$ in., set the dividers to this distance placing one point of them on each of the six divisions and marking a short line to the right of each. By this means, a uniform width for large and small scollops is assured. There are now twelve divisions to nick with the three-square needle file. Next take a 6 in. smooth three-square file and enlarge each

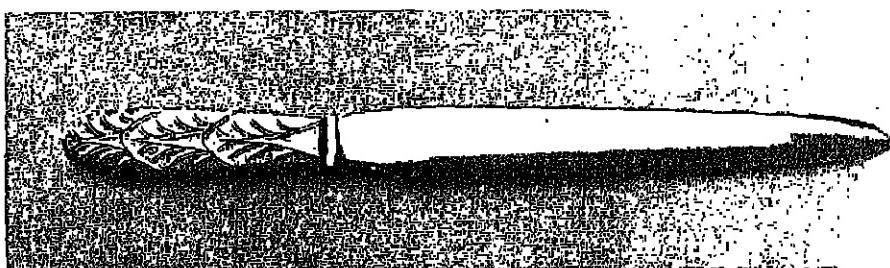
nick to a groove $\frac{1}{8}$ in. deep, having previously drawn a circle lightly with dividers this distance from the edge, Fig. 13. Proceed to round off between these grooves without touching the original outside edge marked X, Fig. 13. When a pleasant curve assumes itself, file lightly and finish with smooth needle file.

The bevel can now be filed with the same files. Careful filing is absolutely necessary at this point to get a clean, sharp edge. Drill keyhole and screwholes as before and polish.

Pl. V, Fig. 4.—Mark and cut out as before a rectangle $2\frac{1}{4}$ in. by $1\frac{1}{2}$ in. Draw a faint line across the plate $\frac{1}{4}$ in. from the top edge and parallel to it. Place the divider point on the centre of this line and describe a

bottom portions are filed to a thickness of $\frac{1}{16}$ in. and the square centre of $1\frac{1}{4}$ in. is left at the original thickness of $\frac{1}{8}$ in., Pl. VI, Fig. 16. When filing a broad surface keep the file perfectly flat so that the thickness is uniform and not thickest in the centre. After shaping the top and bottom of the plate to a semi-circle, the decorated edge is done with a half-round needle file. This is not bevelled.

Pl. V, Fig. 6.—This exercise is similar to Fig. 5, in most respects. The two ends of the oval are shaped and filed to two thicknesses ($\frac{1}{16}$ in. and $\frac{1}{32}$ in.), Pl. VI, Fig. 17. The effect thus produced is extremely pleasant from the point of view of light and shade.



PAPER KNIFE

semicircle above it. With the hack saw cut away almost to this semicircle the two top corners of the rectangle. (Pl. VI, Fig. 14 shows shaded parts cut away.) File exactly to the semicircle. Mark another faint line across the plate $\frac{1}{4}$ in. below the first one parallel to it, and two more vertical lines from the base of the plate $\frac{1}{4}$ in. from each side of the plate, Fig. 15. Saw the narrow rectangular section away. This makes the plate 1 in. wide up to the semicircle. File and true up. Mark, nick, and file the five scollops as in Pl. V, Fig. 3. Notice the gradation in size of them from the top downwards. Finish as previously stated.

Pl. V, Fig. 5.—This design introduces another form of flat filing. The top and

TEACHING HINTS

Decorative filing.—This lesson is a development of Section I, and many of the processes are repeated. The pupils at the end of this exercise will have begun to realise the possibilities and usefulness of the file as a means of decoration. The general idea a boy has of a file is that it is made only to file something flat.

III. PAPER KNIFE

Filing and drilling (continued).—This exercise involves the filing and drilling of long strips of metal. Continue to work in $\frac{1}{8}$ in. brass, ordering the metal in strip form which can be obtained in lengths several



Fig. 3



Fig. 1



Fig. 4

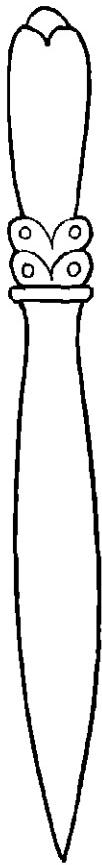


Fig. 2

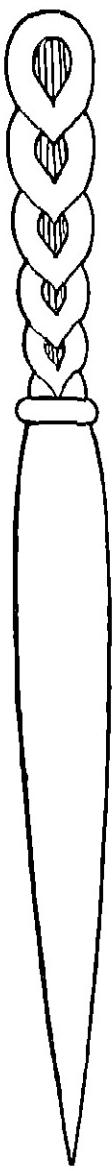


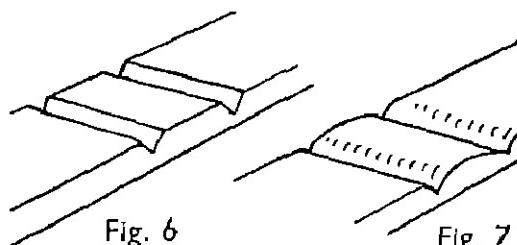
Fig. 5

PLATE VII.—DESIGNS FOR A PAPER KNIFE

feet long. Two widths will be required— $\frac{1}{8}$ in. and $\frac{1}{4}$ in. Plate VII shows five different designs which mainly concern the treatment and decoration of the handle. They may all be attempted in the way suggested in Section II except that the chasing on the handles of Figs. 2, 4, and 5 must be added later in the course when chasing is taken as a lesson.

Pl. VII, Fig. 1.—Saw off from the long brass strip of $\frac{1}{8}$ in. width a portion $7\frac{1}{2}$ in. long. See that the two surfaces are free from deep scratches or other disfigurements, and lightly file or emery cloth if any are visible. With the aid of a trysquare mark a line across the top surface as near to one end of the strip as possible. File to this line by holding the strip in the vice between two metal clamps. Mark a similar line at the other end of the strip and file to this line. Now divide the entire length into the three divisions required; namely, the handle, the part immediately below the handle, and the cutting part.

From the top end of the strip measure with the rule a distance of $2\frac{1}{2}$ in. Draw a line across at right angles and another $\frac{1}{8}$ in. below it. This $\frac{1}{8}$ in. division will form the junction of the handle and the cutting part. Take a 6 in. three-square file and, holding the strip firmly on the bench, file a groove along these two lines, Fig. 6, about $\frac{1}{32}$ in. deep. Avoid filing any deeper as this will weaken the metal. Using the same file round off the corners, Fig. 7. Finish with a smooth



First stage in
filling the decoration

Rounding the
decoration

half-round needle file. Now to shape the handle. Divide this into four equal parts and draw lines across with a sharp hard pencil—not the scribe. A general rule in marking out on metal is this. Guiding lines or lines that are finally not to be seen should be drawn with a pencil. Lines for cutting, filing, and saw piercing should be drawn with a scribe. File a nick on the corner touching each line, Fig. 8, and continue across the

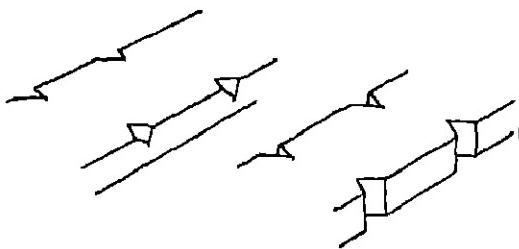


Fig. 8

Fig. 9

Nicking the edges Shaping the edges

edge of the strip, Fig. 9. File the curves between the four divisions and round the top of the handle. The handle is now completed except for taking off the sharp corners with a smooth file.

The cutting part of the paper knife is the next thing to shape. Mark with the scribe the curve of the blade making each side perfectly symmetrical. With the knife in the vice upside down saw away the superfluous metal with a hack-saw and finish shaping with a rough and smooth flat file.



Fig. 10



Fig. 11

Elevation of handle Section of Blade

The part of the blade nearest the handle must be shaped by using a 6 in. second cut file (rough) and finished with a smooth one. From the junction of handle and blade gradually produce by filing a very sharp edge right down to the pointed end. An oval section with sharp ends is thus formed, Figs. 10 and 11. The knife is held in the vice in a horizontal position between clamps during this process. The blade will require much coarse emery clothing and stoning. Polish as already described.

Pl. VII, Fig. 2.—This design is very similar to Fig. 1, but the handle is rather more decorative and requires a higher standard of filing. All lines within the actual outline of the handle are done with a chasing tool. This also applies to Figs. 4 and 5 as referred to at the beginning of the lesson and should be omitted for the moment. The four small circles are drilled holes made with a $\frac{1}{8}$ in. drill, and have the effect of lightening the solidity of the handle apart from a means of decoration.

Pl. VII, Figs. 3 and 4.—The same processes are repeated as in Figs. 1 and 2. The width of brass strip in this case is $\frac{3}{8}$ in. by 9 in. long. The handles are 3 in. long and the length of the blade 6 in. Note that this is straighter and more pointed than hitherto. The front and back surfaces of the handle of Fig. 3 are cross-filed and grooved to obtain a shallow relief as the elevation shows.

Pl. VII, Fig. 5.—This has a pierced handle consisting of graduated holes known as voids (shown shaded). These are formed by drilling a conveniently sized hole in the centre of each void which has previously been marked out with a scribe and filed to the exact shape with needle files (a double half-round one would be the best to use). The top void would allow of a larger drill if there is one in the equipment. Commence with a small one, however, and gradually enlarge the hole in stages. This method is

sometimes easier than attempting to do the job with only one large drill.

TEACHING HINTS

Proportion.—The question of proportion has become a factor—however slight—in this lesson. Draw on the blackboard a paper knife with an obviously small handle, one with a handle far too large, and another with the handle the same length as the blade. Ask the class to criticise them from this point of view. There is no hard and fast rule in regard to this aspect of the work. So much depends on our own sense of what looks right and wrong. We can do little better than study fine old craftsmanship.

IV. TOASTING FORK

Filing, drilling and soldering.—Two pieces of $\frac{1}{8}$ in. brass are needed for this exercise—a strip $\frac{1}{2}$ in. wide and 12 in. long, and an oblong piece 3 in. by $2\frac{1}{4}$ in.

Handle.—Saw and file the ends of the strip at right angles to its length. Mallet the strip flat on the surface plate. Along one end mark off a distance of $\frac{3}{8}$ in. leaving $\frac{1}{16}$ in. on either side. Rule with a scribe two lines running the entire length of the strip tapering from the original width of $\frac{1}{2}$ in. to $\frac{1}{8}$ in. Hold the strip in the vice horizontally with one edge uppermost—not forgetting the clamps—so that about half its width is above the vice jaws, Pl. IX, Fig. 6. It will be impossible to file the whole length of the handle without moving it along the vice a few inches at a time. Begin filing at the tapered end with the 10 in. flat rough file or rather the end that is to be tapered—which will be on our left, and work towards the right or wider end. Avoid filing too long a strip at a time otherwise the part that is not actually held by the vice jaws will vibrate and bend and make an unpleasant squeaky noise. Continue to file to the scribed line until the other end is reached. Reverse the

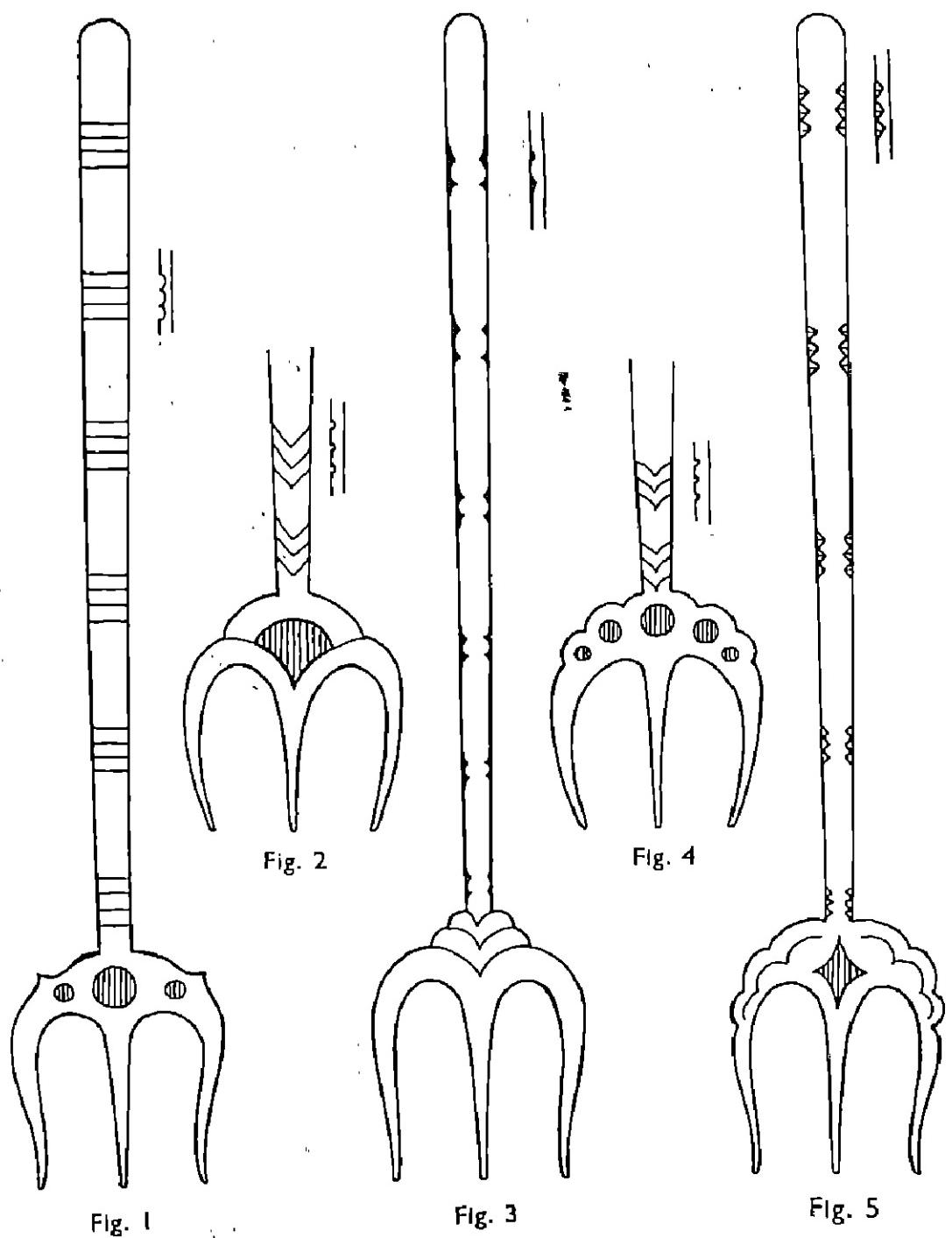


PLATE VIII.—TOASTING FORK

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strip and repeat the process. This time filing will start at the $\frac{1}{2}$ in. end on the left working towards the tapered end because otherwise the marked side of the strip would be turned away. Remember always that the side being worked must face you. To attempt to file to a hidden line by guesswork

is to court disaster; it would involve continually bending over the work to see what we are doing. Finish with a 6 in. smooth flat file. File the wide end semicircular. Examine the surfaces of the strip and emery cloth if necessary. The making of Fig. 1 will now be described in detail.

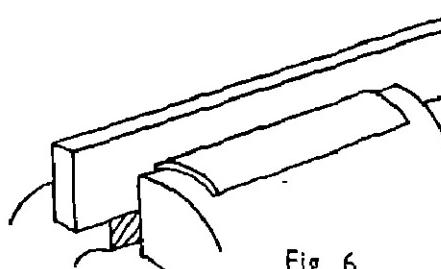


Fig. 6
Position of strip for filing,
note vice clamp

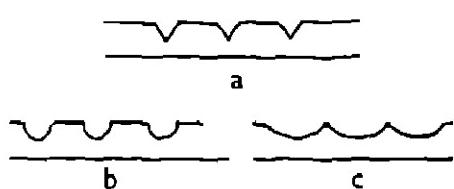


Fig. 7
Three stages in filing
the decoration on handle



Fig. 9
Misplaced holes

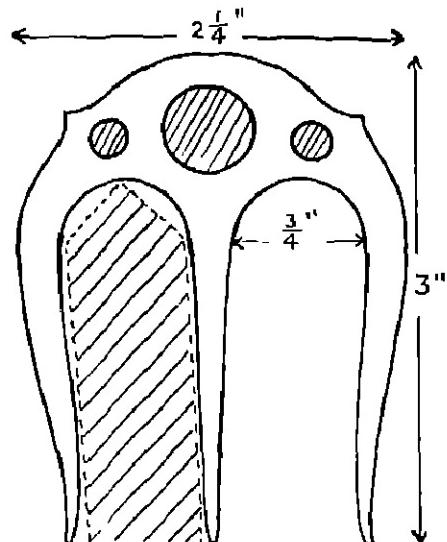


Fig. 8
Setting out the fork



Fig. 10

Decoration.—Measure from the wide end a distance of 1 in. and mark a line across at right angles to a centre line. It is not advisable to use a trysquare for this line since the edges of the strip are no longer parallel; it must be done by judgment. Commencing at this line, measure alternately distances of $1\frac{1}{2}$ in. and $\frac{1}{2}$ in. to the other end. There will thus be six divisions of $\frac{1}{2}$ in. and five of $1\frac{1}{2}$ in. Mark lines across and sub-divide each $\frac{1}{2}$ in. division into three equal parts. Scribe these also. Take a three-square smooth file and file a groove along the centre of each sub-division. Each of these is to be filed hollow by means of a half-round rough needle file (16 cm.), Fig. 7 a, b, and c. The groove will act as a guiding line for the half-round file. The hollow must be very shallow otherwise the metal will be considerably weakened. Finish with a smooth file. The spaces between each set of grooves are filed with a half-round file on their top edges only.

Fork.—Take the rectangular piece of brass and clean with smooth emery cloth. If it is badly discoloured, brush well with pumice powder and water using a black bristle brush obtainable for this purpose. Dry with a clean rag. Mallet perfectly flat on surface plate. (All flat mallets should have their sharp edge filed off to prevent bruising the metal.) The part above the three prongs is filed and decorated. Plate VIII shows five designs for a toasting fork and the setting out of Fig. 1 is shown in Pl. IX, Fig. 8.

Setting out.—Saw or chisel out the rectangle of 1 in. brass (previously explained). File true. Draw a centre line. Measure a distance of $1\frac{1}{2}$ in. from the top of the rectangle on this centre line and describe a semicircle with dividers. Draw a horizontal line through the centre, and describe two more semicircles which will form the curves of the spaces between the prongs. Mark out the three prongs aiming at getting a graceful shape of the outside ones. Curved lines are difficult to draw well with a scribe so use

a sharp, hard pencil first. (Pencil lines are easily removed.) Now saw out the spaces between the prongs. Be careful not to saw right up to the line but leave a fraction for filing. (Note shaded portion.) It will be seen that it is possible only to saw up to the base of the semicircle at the top of each space since we cannot turn the saw round. Complete the remainder with a chisel—it is better for this to be narrow rather than too wide. Two or more blows can be made with a narrow chisel, but it is impossible to shorten the blow of a wider one. File to shape using a 6 in. flat file for the centre prong, and a half-round one for the outer ones. Now draw the shape of the top part of the fork and file with suitably shaped files. Drill the circular hole with a $\frac{1}{2}$ in. drill and the two small ones with a $\frac{3}{16}$ in. drill. Avoid misplaced holes as in Pl. IX, Fig. 9. File all sharp edges off—even the inside of the drilled holes. Sharp edges on an object of this kind look decidedly unpleasant and should be avoided if possible; especially in objects which are handled from time to time. Well emery cloth and polish as before. This is usually left until the completion of a piece of work, but in this case it is better to be done now.

Hard soldering.—The handle and fork are now ready for soldering together. Since the purpose of a toasting fork is to hold something of a light nature a butt joint will be quite strong enough. This is the joining of two pieces of metal by means of soldering their vertical edges together. We shall use hard silver solder for this process as is usual for all joints. Hard solder does not run so freely as easy solder, therefore it is necessary to assist its flow by filing a number of grooves in the edges of the metals which are to be soldered, Fig. 10, a and b. A small three-square file will do. Mix some powdered borax (the flux used for preventing oxidation and to assist the flow of the solder) with water into a small glass vessel—glass is preferable to metal—and apply this to the joints with a small camel hair brush known

as a borax "pencil." Place the handle and fork on the hearth brick—the grooved side should be uppermost—with their boraxed edges touching each other. Cut a small panel of hard silver solder—about $\frac{3}{16}$ in. by $\frac{1}{8}$ in.—from the sheet and, after dipping this in the borax, place along the joint. (It is most important that the solder should be boraxed as well as the work.) Now apply a gentle flame to the whole of the work until the borax has subsided after bubbling. Move the flame about and gradually increase its intensity at the same time concentrate its direction to the joint. The metal will soon change its colour and become red. As soon as the solder begins to melt it will run into the joint. Control of the blow lamp is essential at this stage to avoid overheating the metal and probably melting it. Gradually soften the flame until the metal has lost its intense heat and allow the work to cool. Make sure that the solder has penetrated to the back of the work; if not, reverse it and repeat the operation. With the copper tongs slowly submerge the work in the acid vat (pickle) for several minutes. This removes the oxide and dissolves the borax. Remove from the vat and swill in cold water. Clean with pumice powder and brush and dry. File off any superfluous solder and emery cloth smooth. Polish with the mixture of pumice and oil, wipe clean and finally polish with tripoli composition.

The pierced parts of Plate VIII, Figs. 2 and 5, are done by using a conveniently sized drill and filing to the shape required. Fig. 4 has five holes which can be drilled with different sized drills or by one drill and getting gradation in size by filing.

TEACHING HINTS.

Annealing.—Annealing is best carried out in a subdued light. Strong sunlight makes it difficult to see the colour of metal at a high temperature. In the case of artificial light it is advisable to have the light so arranged that it can be switched off during this operation.

Soldering.—Give a demonstration of soldering to the class, explaining the meaning of a soft and fierce flame and when to use them.

V. SERVIETTE RING

Hammering and soldering.—This section gives practice in hammering and soldering a simple cylindrical object.

Bending.—The size of the ring will be $1\frac{1}{4}$ in. in diameter and $\frac{3}{8}$ in. deep. Cut out a strip of gilding metal 22 S.W.G. $5\frac{3}{8}$ in. long by just over $\frac{3}{8}$ in. wide. (This little extra on the width will allow for trueing up.) Flatten with the mallet on the surface plate and clean with pumice powder and brush. File the two ends perfectly flat and at right angles to the sides of the strip. Bend the strip round, beginning with the two ends after having nicked them by tapping with the corner of a flat file, Pl. XI, Fig. 7. The bending operation is done with the flat end of a mallet on the cylindrical end of the stake, Pl. II, Fig. 1. This helps considerably when joining the ends together, Pl. XI, Fig. 8. Complete the bending until the strip is roughly round. Take a length of medium gauge binding wire and cut two pieces off sufficient to go round the strip, allowing for their ends to be twisted together. Each one should be about $\frac{1}{8}$ in. from the edge. Use a pair of flat-nosed pliers for securing the binding wires, pulling gently at each turn, Fig. 9.

Soldering.—Borax the outside and inside of the seam and place the ring on the hearth brick, the grooved side of which being uppermost. Lean the ring against a small piece of brick or coke at an angle of about 60° , Fig. 10. See that the seam is at the bottom immediately above the horizontal brick on which it rests. Cut a number of panels from a sheet of hard silver solder, borax them and place them on the inside of the seam, Fig. 11. Heat the ring, gently increasing the fierceness of the flame gradually. (Do not direct a fierce flame on the seam

to begin with otherwise a sudden expansion of the metal will take place, and the seam will open.) When the solder has run along the seam, allow the ring to cool. Remove binding wires by untwisting. Suspend the ring in the acid vat by means of a piece of metal wire—copper, brass or gilding wire will do—making a hook of the ends; one hook for the ring and the other to grip the edge of the vat. It may take several minutes to dissolve the borax. Swill in cold water, dry with rag or a gentle flame. File the inside of the ring with a half-round smooth file and emery cloth. Rub the edges of the ring on an emery board (a piece of wood covered with emery cloth).

Planishing.—It will have been noticed by now that the surface of metal left from the rolling process is decidedly uninteresting. It looks lifeless and too mechanically smooth. By hammering intelligently, a most beautiful texture can be imparted. Planishing metal, however, is often sadly abused. To aim consciously at getting heavy and coarse hammer marks is not far short of a crime. It is a ghastly affectation and should be discouraged at all costs. Fine hammering lies in the achievement of a smooth surface which naturally becomes faceted by the blow of the hammer; just sufficient weight being imparted to the blow to produce a fine textured surface. The centre of the hammer face rather than its edges should strike the metal otherwise there is a danger of badly bruising the surface of the work. Practice on a piece of scrap metal with the least possible motion of the arm. Planishing is mostly a wrist movement.

Draw a pencil line round the centre of the ring. See that the stake on which the ring was rounded is quite smooth and free from scratches. This is most important as a smooth surface inside the ring depends upon this. Commence planishing in the centre on the pencil line and work round, turning the ring with the left hand to the right after three or four blows. The hammer must fall on the point where the ring touches the stake.

Listen for a sharp clear ring accompanying each blow. A dull, indefinite sound means that there is a space between the metal and the stake. Pl. XI, Fig. 12 shows the hammer at the right angle. The dotted lines show the incorrect position. Lighten the blows as the edge is reached or the edge will stretch and produce a hollow form to the ring. If anything, there should be a fullness, that is, a slight deviation from a mechanically straight line. Reverse the ring and work to the other edge. The ring will be decorated as in Pl. X, Fig. 1.

Decoration.—Place the ring on the surface plate and scribe a line round $\frac{9}{16}$ in. from the edge with the scribing block. The block is held still and the ring turned round against the point. Repeat this on the other edge. Hold a cylindrical piece of wood in the vice and place the ring upon it. It is dangerous to use the stake in case the file about to be used slips and marks it. File a groove round the scribed lines with a three-square needle file. Enlarge this with a round needle file, thus forming a shallow hollow moulding as in Section IV. Mark a number of divisions round the edge of the ring and, using the three-square needle file, shape the edge on the outside corner only, Pl. XI, Fig. 13a. Polish in the usual way.

The decoration on Pl. X, Fig. 3, is somewhat similar (Pl. XI, Fig. 13b) except that the filing is rather more complicated.

Wire soldering.—Pl. X, Figs. 2 and 4, have half-round wires soldered to their edges. Wires are used either for decorative effect or for strengthening edges of thin metal or both. To mount and solder a couple of these wires on to a ring that has been planished, take a length of half-round gilding metal wire about $\frac{1}{32}$ of an inch across its flat side. Anneal to a dull red and, when cold, bend it round the ring with its flat side touching it. Nick to the right size allowing for stretching and by bending the wire will break. File the ends flat and bend it round the stake as the strip of metal was bent for

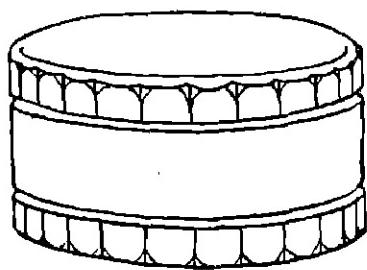


Fig. 1

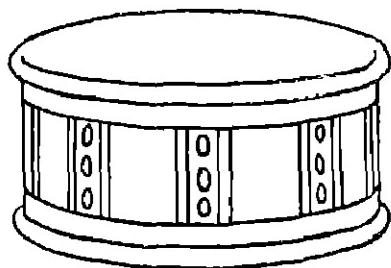


Fig. 2

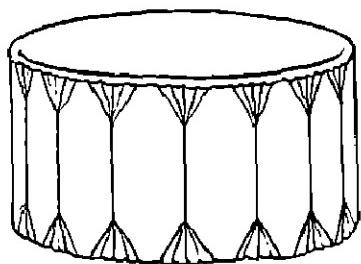


Fig. 3

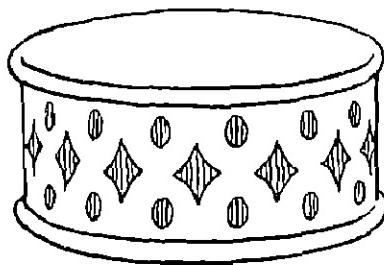


Fig. 4

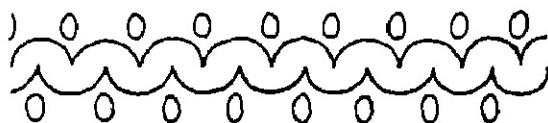


Fig. 5



Fig. 6

PLATE X.—DESIGNS FOR A SERVIETTE RING



Fig. 7
Nicking the edge
for soldering

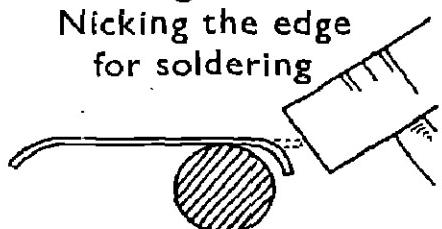


Fig. 8
Bending up the ring



Fig. 9
Wiring the ring for soldering

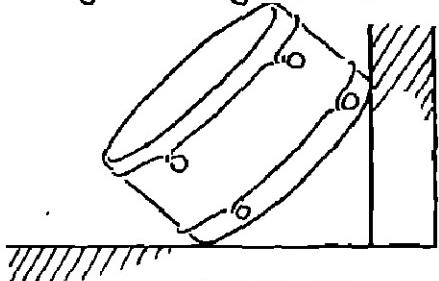


Fig. 10
Position of ring for soldering



Fig. 11
Panels of solder placed
along the seam

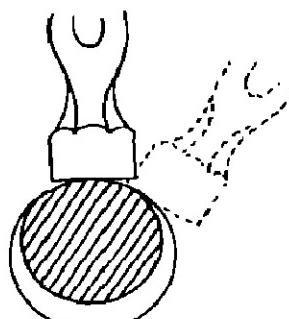


Fig. 12
Correct and incorrect angle
of hammer for planishing

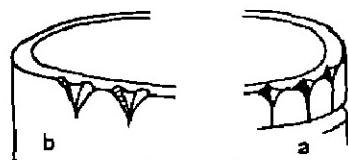


Fig. 13
Filed decorations
of the edge of ring

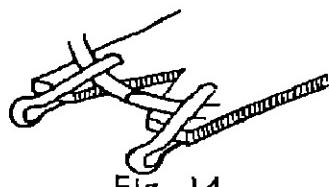


Fig. 14
Holding the two ends of the wire
in position for soldering



Fig. 15
Panels of solder placed
for soldering

the ring. Spring the ends until they touch. Borax the joint for hard soldering. Now comes the difficulty of soldering the ends together. Wire cannot be bound because of the curved surface. If the wire were thicker its own spring would be sufficient. Thin wire always expands rapidly under heat. Fig. 14 shows a good method of getting over the difficulty. Cut a wedge-shape out of a piece of scrap metal of thick gauge and secure the wire with cotter pins. Place on the hearth brick and apply the panel of solder. Heat with the blow lamp as before until the solder runs. Remove the wire from the plate of metal and file smooth. Mallet round on the stake very gently as thin wire stretches easily. Place the wire on the surface plate and tap lightly with the mallet until it lies flat. The wire should now fit fairly tightly over the serviette ring. It should only require finger pressure and it should not be necessary to hammer it over. If it is too tight use the mallet again on the stake. See that the wire is parallel with the edge of the ring and flush with it. Borax the wire on both its edges; also the hard soldered seam. Great care is necessary in applying borax at this stage because too much will bubble and the panels of solder will jump off. Place the ring on the hearth brick with its wired edge at the bottom. Cut some panels of easy running solder and place them between the junction of wire and ring, at regular intervals, Pl. XI, Fig. 15. Heat slowly, turning the soldering tray round and round to obtain an even annealing and soldering. The solder will be seen to run round as long as the flame is guided round with it. When cool, pickle and clean with pumice. The soldering of the remaining wire is simply a matter of repetition. File off any superfluous solder with a half-round needle file and polish.

Drilling.—The decoration of Pl. X, Fig. 4, is pierced with a $\frac{1}{8}$ in. and $\frac{3}{16}$ in. drill. The ring, complete with soldered wires, is held over a round piece of wood in the vice by another pupil whilst the maker drills the holes. The small holes are filed oval with a

double half-round needle file. The larger ones are filed to a diamond shape with a knife-edged needle file. Figs. 5 and 6 show the actual size of the strip in the flat and suggestions for decoration.

The tools necessary for the decoration of Fig. 2 and for Sections III and IV are dealt with in the next Section.

TEACHING HINTS

Planishing.—Planish a piece of metal with a hammer which is obviously too heavy so that a coarse and unpleasant texture is produced. Hammer a similar piece of metal lightly and carefully. Put these side by side with a piece of metal in the state in which it is ordered and explain to the class the merits and defects of each.

VI. MAKING CHASING TOOLS

Straight tracer.—The chasing tools described below are required for the decoration introduced in Sections III, IV, and V. From a length of cast steel $\frac{8}{10}$ in. square rod, saw off a length of 4 in. long with the hack saw. File each end flat and at right angles to the rod. Use a flat 8 in. second-cut file—not a new one if an old one is available. Hold the rod in the vice between clamps at the angle shown in Pl. XII, Fig. 1. Begin at the end shown above the vice and file down to half its thickness. Alter its position to a horizontal one (Fig. 2) and gradually file to the other end, lightening the weight as the file moves along. Reverse the rod and taper the opposite side in a similar fashion, Fig. 3. The rod at this moment is in the form of a chisel with a sharp straight end. Remove it again and this time put it in the vice cornerways so that two opposite corners of its square end are in a vertical line, Fig. 4. File each corner off so that an octagonal section is produced, narrowing the facet as it reaches the sharp end, Fig. 5a. Place vertically in the vice with the sharp end uppermost and file the sharp edge away

to $\frac{1}{2}$ of an inch at the same time slightly round it, Fig. 5b. Reverse the rod and file round the sharp corners of the square end, Fig. 5c. Finish with a smooth flat file and emery

Hardening steel.—Heat the sharp end to a glowing redness ($\frac{1}{2}$ in. is sufficient) and plunge immediately in cold water. The tool is now hardened. Dry and emery cloth



CORRECT POSITION FOR CHASING
Note the position of the fingers of the left hand.

cloth. The sharp end must now be qualified to make it usable. Rub this along a sheet of No. 1 emery cloth until it is the right shape, Fig. 5d. The tool is now ready for hardening and tempering.

about 1 in. of the end just hardened and apply the heat again, but this time to the centre of the tool. A small flame is necessary. The steel will gradually change colour. When a yellow-brown colour is noticed right at

the extreme end, the tool must once again be plunged in cold water. It is now tempered and completed.

Curved tracer.—Repeat the processes with a similar rod of steel to the operation of Fig. 5b. Take a half-round needle file and groove one side of the sharp end, Fig. 6a. File the opposite side round and parallel with the curve, Fig. 6b. Round the edge with a smooth file and emery cloth. To smooth the concave edge, rub the tool along a half-round file over which is placed a piece of fine emery cloth. Harden and temper as before.

Oval punch.—File one end down to an oblong $\frac{1}{8}$ in. by $\frac{3}{32}$ in., Fig. 7a. Convert this into an oval, Fig. 7b. Smooth the oval end on emery cloth holding the tool vertically. Harden and temper.

Chasing the decoration on the paper knife.—Before working on the handle it is advisable to practise on a piece of scrap $\frac{1}{8}$ in. brass stuck on to a pitch bowl. Draw a few straight and curved lines several inches long. Chase the straight lines first. Hold the straight tracer on the drawn line and with the chasing hammer (Pl. IV, Fig. 2) strike the tool with a sharp blow. Move the tool along the line just made and strike once more. We notice that the line is getting longer at each blow of the hammer. Continue until the whole line has been chased. With experience it will be possible to glide the tool along rapidly as the tool is struck, but it is better to place the tool carefully and precisely and take one's time. Next chase the curved line in the same way. The photograph at the beginning of this section shows the correct position of the hand and tool. It is important that the tool be held firmly with the thumb and first three fingers of the left hand. The third and fourth fingers rest upon the metal being chased and guide the tool along.

The paper knife handle may now be chased. Draw on the pattern with a sharp pencil and go over them with the scribe.

Melt the pitch in the pitch pot and add a little tallow. Mix together and add plenty of plaster of Paris. Stir well, adding the plaster until it becomes difficult to stir any longer. The correct consistency for chasing purposes is proved by marking with the thumb nail when the pitch is quite cold. Such an incision should be just possible. Half fill the pitch bowl with coke and fill to the top with the pitch. Allow it to set hard. It will be necessary to warm it again with a gentle flame before the paper knife handle will hold firm. Warm the handle also. Place the handle on when the pitch is tacky and allow it to cool and set.

If it is found that the curved tool is too round for this particular job, the straight one may be used. (It is often better to chase a curved line with a straight tracer, providing the curve is not too sharp.) A short sharp curve will demand a small curved tool.

Chasing the decoration on the toasting forks.—It may prove quicker to chase these without sticking them on pitch; especially since the handles are so long. Another pupil can be asked to hold the fork on the surface plate during this operation. Pl. VIII, Fig. 2 presents the simplest exercise. Each group of three lines on the handle is done with the straight tracer.

Chasing the decoration on the serviette ring (Pl. X, Fig. 2).—The ring is held on the stake used in the lesson by another pupil. The lines of course have been marked on in the usual way. Chase the two lines running parallel with the edges of the ring first. After each blow with the chasing hammer, the ring must be turned round so that the tool is striking that part which is actually touching the stake. Next chase the vertical lines and avoid trespassing beyond the horizontal ones. The oval punch comes next. See that the major axis of the oval is parallel with the vertical lines. One blow with the hammer should be sufficient.

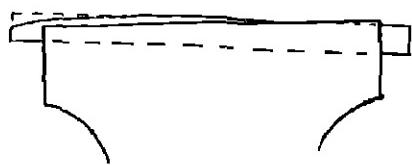


Fig. 1
Angle of rod for filing

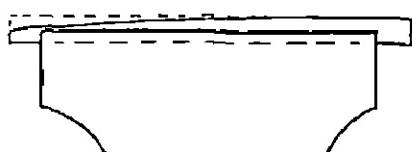
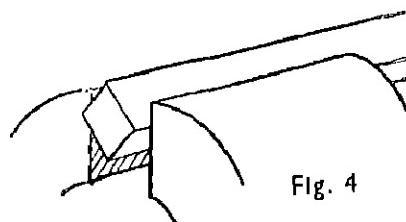


Fig. 2
Tapering end of rod



Fig. 3
Shape of end of rod
for a straight tracer



Position of rod for
filing the corners



(a) Filing the rod
into an octagon



(c) Shaping the
other end

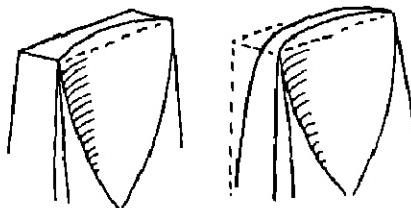


(b) Taking off
the sharp edge

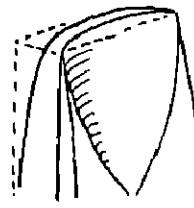


(d) the required shape

Fig. 5



a. Filling the hollow
side of a curved tracer



b. Filling
the back

Fig. 6

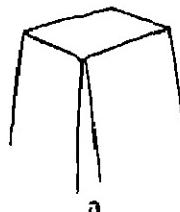
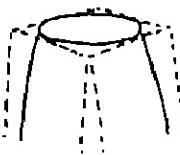


Fig. 7
Making an oval punch



TEACHING HINTS

Filing steel.—This is another lesson where new files should not be used. Steel will take the "bite" off them very quickly. Use old ones.

Cast steel.—Explain that steel is iron with a percentage of carbon in it. Point out that cast steel is very brittle and will break with a sharp blow with the hammer.

VII. SAW PIERCING METAL

Preparation.—Cut out with the shears a $1\frac{1}{4}$ in. square of gilding metal 22 S.W.G., mallet flat on the surface plate and clean

with pumice powder and brush. If a brush is not available a clean piece of soft rag will answer the purpose if dipped in water. After being dried the metal is ready for saw piercing. By studying the illustrations on Pl. XIII it will be noticed what an endless variety of shapes can be obtained by saw piercing.

In the previous section the drill has been the only means of perforation and, up to now, has sufficed; but in this section the use of the drill only would entail endless labour and difficulty. The square of metal is now to be pierced on the saw peg fitted to the bench top. A larger one could be made and held in the vice, Fig. 13. (The bench is often too low for this operation.)



CORRECT POSITION OF THE SAW AND HANDS IN SAW PIERCING

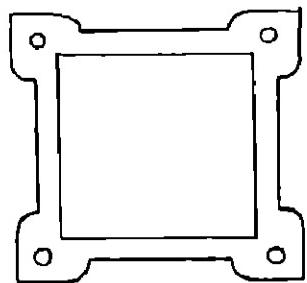


Fig. 1

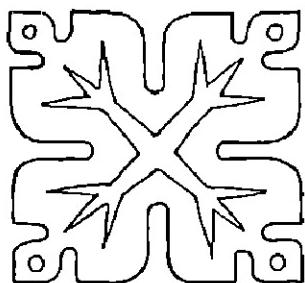


Fig. 2

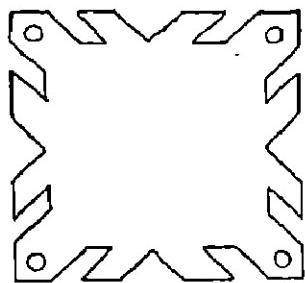


Fig. 3

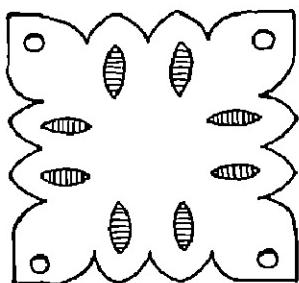


Fig. 4

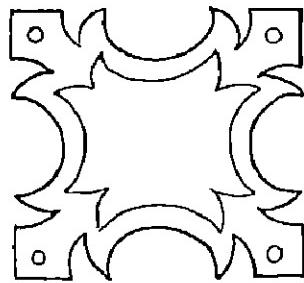


Fig. 5

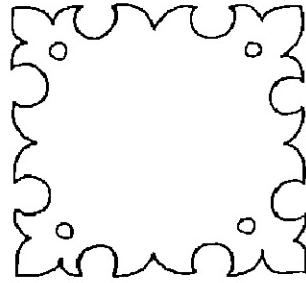


Fig. 6

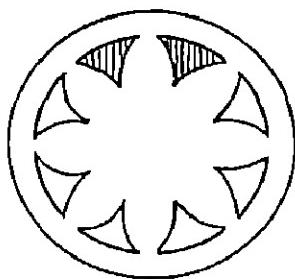


Fig. 7

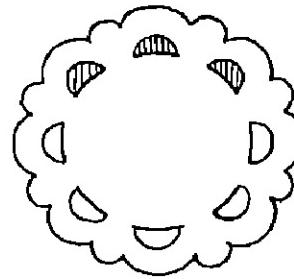


Fig. 8

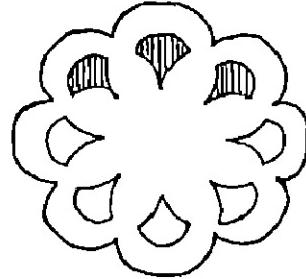


Fig. 9

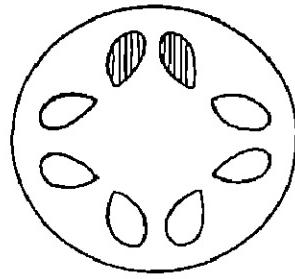


Fig. 10

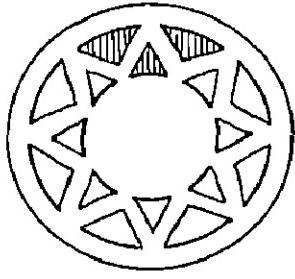


Fig. 11

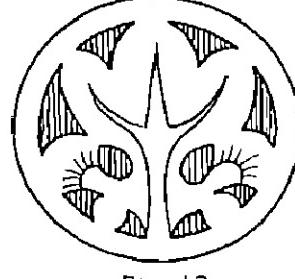


Fig. 12

PLATE XIII.—SAW PIERCING EXERCISES

Setting out—Pl. XIII, Fig. 1.—Set out the pattern as shown with a rule and dividers and mark the lines with a hard pencil, Fig. 14. Sit on a stool which is the right height for this work. Place the metal on the peg and hold in position with the left hand. A medium cut saw (No. 3) has, of course been previously screwed tight in the saw frame. One end of the saw is screwed in the top slot of the frame first, followed by gently pressing the frame and inserting the other end. This makes it taut. (Too tight a saw will, however, break easily.) Make sure that the teeth of the saw are facing in the right direction; the cut taking place on the downward stroke. Rub a piece of beeswax along it to assist the cutting.

Piercing.—Begin at the point marked X (Fig. 14) and saw as near to the line as possible. As the saw follows the curve, slowly turn the metal round in sympathy with it, keeping it vertical during its whole course. It will be impossible to negotiate the sharp corner marked (b) except by making a curve. The saw and plate should be turned simultaneously to do this, otherwise the saw will break. Continue along the straight line and negotiate the other curve. The waste metal will then fall away. Saw the remaining sides of the square in the same way. File the corners sharp with a flat needle file and smooth the edges all round.

Drilling.—Centre-punch the corners of the plate and drill with a $\frac{1}{8}$ in. drill. The faintly-drawn inner square in Pl. XIII, Fig. 1, is chased with the straight tracer made in Lesson 6 merely as a decoration.

Pl. XIII, Fig. 4.—The shaded shapes are first drilled with a small drill sufficient to pass the saw through. Drill this hole as near to the line as possible, not in the centre of the shape. There is no point in sawing through metal which is afterwards waste. Fig. 15a shows the correct position for drill and Fig. 15b shows the incorrect position.

Fig. 4, Pl. XIII, is more strictly saw piercing than Fig. 1, for the latter is really a process

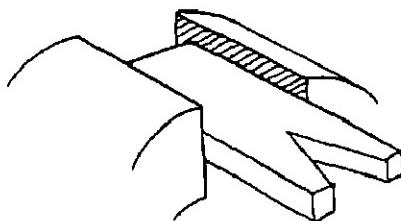


Fig. 13

Saw peg held in the vice

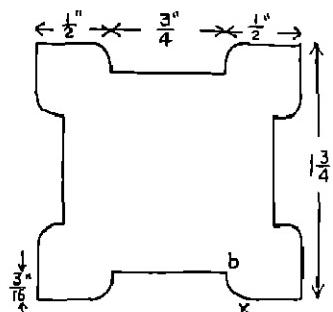


Fig. 14

Setting out Fig. 1



Fig. 15

(a) Correct position of drill hole
(b) Incorrect



Fig. 16

(a) Good shapes for voids
(b) Bad Shapes

of shaping the edge of metal rather than making holes by means of a saw.

Figs. 7 to 12, may first be cut with the straight shears from a square if it be a case of saving time. The piercing need apply to the shapes inside the circle only. Some of the designs suggested would make excellent back plates for a drop handle set as a later section.

TEACHING HINTS

Too thick a metal is not really practical for saw piercing. Progress is slow and tiresome, and the saws, especially in the hands of young pupils, break easily owing to their brittle nature. Point out to the class the value of pleasant and symmetrical shapes as holes. Draw on the blackboard one or two good shapes and contrast these with irregular and ugly ones, Fig. 16.

VIII. TEA CADDY SPOON

Doming, planishing, filing.—This lesson gives experience in the use of the ball-pane hammer for doming, and the flat-faced hammer for planishing. The planishing should be practised on a scrap piece of metal before working on the spoon.

Setting out.—Cut out an oblong piece of 22 S.W.G. gilding metal $2\frac{1}{4}$ by $1\frac{1}{2}$ in. from the sheet. Mallet flat and clean as before. Mark out with dividers, steel rule and a sharp pencil as shown in Fig. 6. Cut out the almost complete circle with a pair of straight shears, taking care not to cut into the section shown as a dotted line. Alternatively it may be sawn through with the fret saw. Smooth all edges with a flat file. Again mallet flat. Take a block of wood (deal will do) about 3 in. square and gouge out a hollow depression $\frac{1}{2}$ in. deep and $1\frac{1}{2}$ in. in diameter.

Doming.—The end grain should be selected for this operation. With the ball-pane hammer (Pl. IV, Fig. 6) proceed to dome the

circular part of the spoon starting round the extreme edge, Pl. XV, Fig. 7. The spoon is held almost vertically to begin with, gradually lowering it as the centre is reached. Fix the stake known as a "mushroom" stake in the vice and mallet the spoon smooth. The handle will have turned up in sympathy with the doming, Fig. 8. This need not be considered for the moment.

Planishing.—Draw several compass lines round the convex side of the spoon, placing the point in the centre. These lines will act as a guide in planishing the spoon and help us to keep an even contour. With the small planishing hammer (Pl. IV, Fig. 3) hammer lightly, starting at the centre. As explained in Section V, the surface obtained will depend largely on the smoothness of the stake and hammer. It is important that the inside of the spoon (the surface touching the stake) should be as smooth and free from blemishes as the outside. If the stake is rough and covered with file marks, then the spoon will bear the same disfigurements. Planish in concentric circles, moving the spoon round between each group of blows. If the hammer has been rubbed vigorously on very smooth emery cloth and finally on a buff stick or No. 0 emery cloth, a mirror surface should be the result. Remember that the brightest surface possible is essential to achieve the highest quality in planishing. It is a good thing when polishing a hammer to round its edges. A flat hammer is flat only in a strict sense of the word. A slight deviation from a perfectly straight face is what is wanted, and constant care and attention will be well rewarded. Every single hammer mark should be clearly visible and distinct from the smooth yet comparatively matt surface of the metal previously cleaned with pumice powder. It is possible to hammer in one spot several times because the marks are not seen clearly, with the result that a lump is formed through over stretching. As in the case of the serviette ring, when about $\frac{1}{2}$ in. from the edge of the metal, lighten the blows in order not to thin

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the edge. Thin edges should be avoided in all forms of hammering.

Shaping the handle.—Anneal the spoon, clean, and on the same stake mallet the

handle to the required curve, Pl. XV, Fig. 9. Planish as before, starting at the point where the handle joins the spoon and work towards its extremity. The most difficult part to shape will be the point marked *a*,

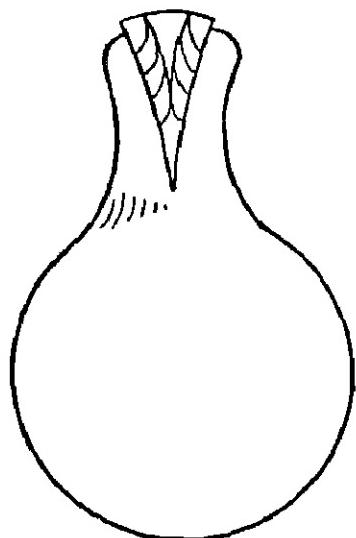


Fig. 1 (a)



Fig. 1 (b)

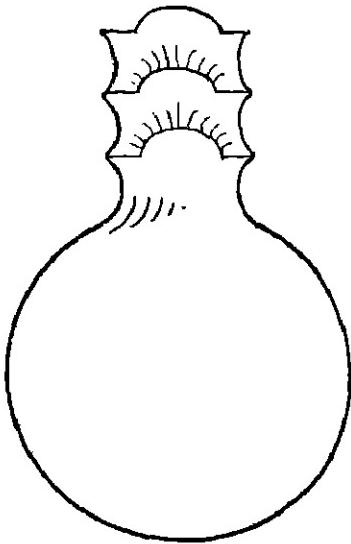


Fig. 2

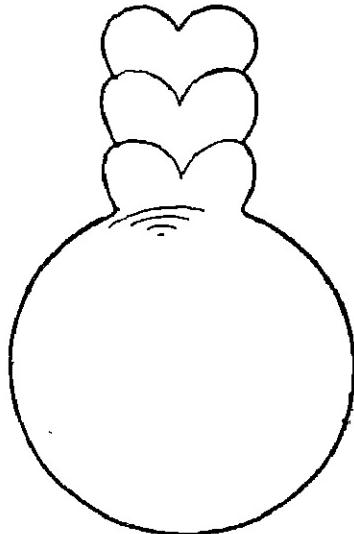


Fig. 3

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Fig. 9. This is where two opposite curves meet in plan and elevation and it will be necessary to use the small collet hammer, Pl. IV, Fig. I.

Truing up.—Slightly round the end of the handle with a file and also the sides of it. In all probability the shape originally started with has become distorted through hammer-

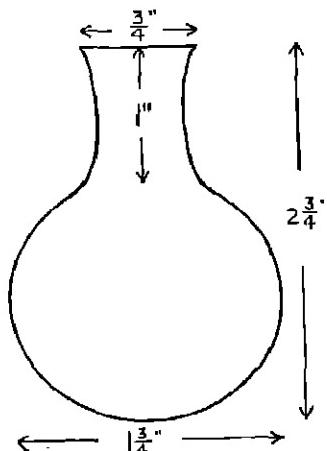


Fig. 6
Setting out the shape of spoon

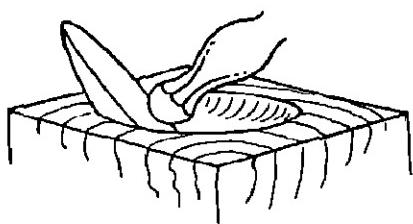


Fig. 7 Doming the bowl



Fig. 8
Angle of handle resulting
from the doming of bowl

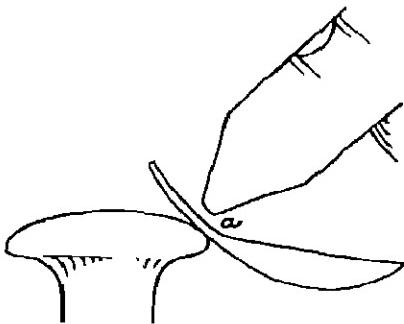


Fig. 9
Shaping the handle



Fig. 10
Filling straight the
top of bowl

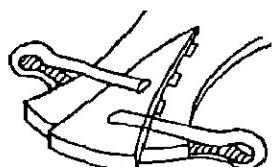


Fig. 11
Securing the additional
piece of metal

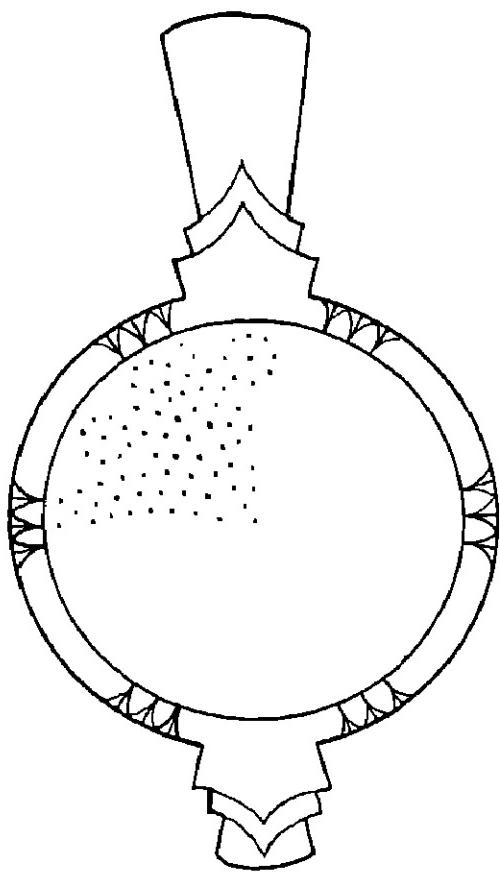


Fig. 1

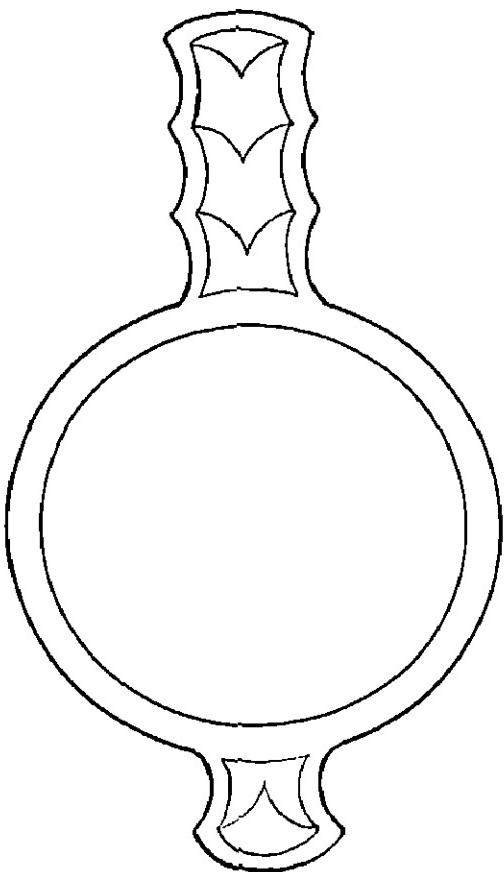


Fig. 2

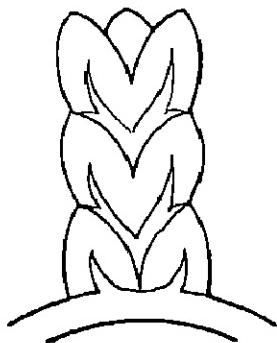


Fig. 3

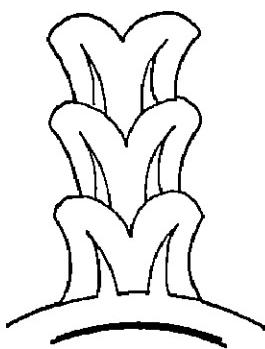


Fig. 4

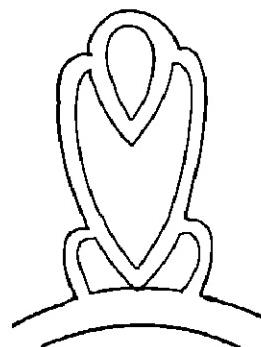


Fig. 5

PLATE XVI.—DESIGNS FOR A TEA STRAINER

ing and shaping and needs to be made symmetrically even. The hollow part of the spoon, too, will be found to have an irregular edge. File this to a flat plane and finally to a suggestion of a curve, thus giving a sweeping line to the whole thing, Pl. XV, Fig. 10.

Decoration.—The handle will need strengthening now and one way is to cut or saw out a piece of similar metal and thickness and file it to the shape suggested, Pl. XIV, Fig. 1a. Planish it to the curve of the handle, first longways and then cross-ways. Lightly emery cloth the handle and

place the wedge-shaped piece of metal in position, allowing it to project $\frac{1}{4}$ in., Pl. XV, Fig. 11. Secure with cotter pins, and place panels of easy solder along the joint after boraxing carefully all round and underneath the projection. Solder as before. If any lumps of solder remain, they can be cut away with a flat scorper (a small chisel); a scraper may be used instead (a thin rod of iron filed like a scribe) and dragged along the joint while soldering. Pickle clean and dry. Set the spoon—the handle only is necessary—on a pitch bowl or block and chase the veins with a small curved trace or short straight one. Remove spoon and

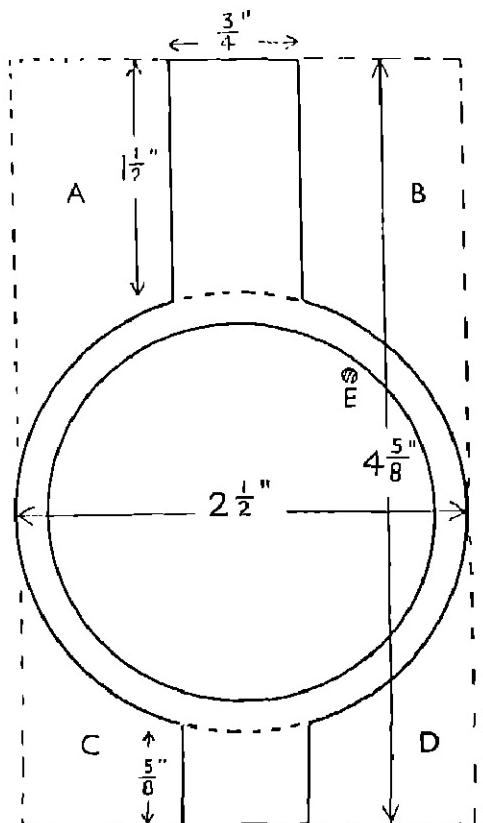


Fig. 6
Setting out the shape

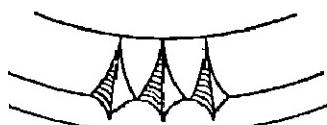


Fig. 7
Decorating the edge of rim



Fig. 8
Wiring the plate to the bowl



Fig. 9
Section showing the gripping
of the wires to the plate

any remaining pitch which may have stuck to the underside of the handle with paraffin and rag. File all sharp corners off and polish.

TEACHING HINTS

This is the first lesson where form, as distinct from shape, becomes apparent to the pupils. They will learn something of unity of design and the relationship between a round or hollow form and a comparatively flat shape. The sweep of the bowl into the handle is a beginning in this direction.

Explain the meaning of fitness for purpose as is exemplified in the strengthening of the handle and rounding of all sharp edges for comfort in holding.

metal for holding foodstuffs should be either tinned or silver plated.) Flatten with the mallet and clean with pumice powder. Mark out with pencil compasses and rule the dimensions shown in Pl. XVII, Fig. 6. Dividers should be used except for the portions of the outer circle shown as a dotted line. With a fret saw, saw away the parts A, B, C and D. Drill a small hole near the edge of the inner circle marked E and saw pierce this also. Be careful not to cut into the space between the two circles. It is far wiser to keep away from the line rather than go over it. (Refer to notes on saw piercing in Section VII. Take a smooth half-round file and file nearly to the scribed line. With the flat side of the file, true up the outside circle and projecting parts.

IX. TEA STRAINER

Doming and saw piercing.—The soldering of a domed piece of metal to a flat top is the aim of this section. Neatness in soldering and fitting are the essential points.

Setting out.—There are three methods of making a tea strainer of this kind. Firstly, it would be possible to make it all in one piece out of thick metal. Secondly, the bowl could be made of one piece of thinner metal with the handle and extension added by soldering, in which case a wire would have to be soldered round the edge of the bowl to strengthen it. Thirdly—perhaps the best way for the beginner—the wire edging of the bowl and the handle could be made in one piece, to which is soldered the bowl itself. Unfortunately, this method wastes a fair amount of metal but most of it can be used again in some way. The third method is that dealt with in this section.

Cutting out.—Cut out, in the manner suggested in Section VIII, an oblong from a sheet of 22 S.W.G. gilding metal or brass. Either metal will do since it will be necessary—if the strainer is to be used—to have it silver plated. (Any object made in base

Planishing.—Lightly planish all over with a view to getting it perfectly flat. It must lie on the surface plate without rocking in the slightest degree. Use the flat-faced hammer which has its edges well rounded, care being taken to let it fall vertically so that the centre of the face hits the metal. Heavy blows must be avoided as this will stretch the metal out of shape.

Filing.—Either saw or file the handle and extension to shape after marking out. With dividers, divide the outer circle on the extreme edge into six parts and nick it at these points with a three-square file. File the simple decoration shown in Fig. 1 with the needle file of the same section, Fig. 7.

Doming.—Cut out a $2\frac{1}{4}$ in. disc of 24 S.W.G. gilding metal, clean it and proceed to dome it as in Section VIII. A sandbag will be found useful for doing this but the wood block is much harder. Use the ball-pane hammer as before, working from the edge towards the centre. Smooth with the mallet and anneal. Clean by pickling and planish as was done for the caddy spoon. File the edge perfectly flat and rub down on the emery board until the diameter is $2\frac{1}{8}$ in.—the size of the inner circle of the top plate.

On no account must the bowl be smaller otherwise, of course, it will simply fall through the plate to which it is to be soldered. Clean and emery cloth the edges of the bowl and one side of the plate, and wire the two parts together as suggested in Fig. 8. Three lengths of medium thickness binding wire of about 7 in. long are required. Bend each into two, passing one half over the convex side of the bowl and the other half under it, Fig. 9. Form a loop at the point where the wire touches the rim and clip the end under the bowl. Tighten with pliers.

Soldering.--Borax the joint between dome and rim (both sides) and place panels of easy solder in position round it after the borax has subsided as the result of a gentle flame. Place the work on the grooved side of the hearth brick and apply a soft flame all over, turning the tray round slowly. Increase the heat until the solder runs. Allow to cool, remove binding wires and pickle. Swill in cold water and scrub with the pumice brush. File surplus solder away and finish with emery cloth. Use water-of-Ayr stone with water and rub vigorously round the joint. Polish with pumice and oil, and finish with tripoli. The holes are drilled with a $\frac{1}{32}$ in. drill about $\frac{1}{8}$ in. apart.

TEACHING HINTS

The pupils will by now have learned something of what is known as "mounting," that is, the putting together of two or more parts to form a whole piece of work as distinct from working in the flat. Allow them in the first place to draw out several designs for the handle.

X. DROP HANDLE

We should all desire to have on our furniture a well-designed drop handle. However good a chest of drawers or wardrobe may be from a point of view of design or construction, it would be spoiled--as is

often the case--by a badly designed handle. This section gives an opportunity of making a strong and pleasant handle which should be applied to a piece of furniture, if possible, to appreciate this correlation of metal and wood.

Plate.--Cut out a disc of 18 S.W.G. brass and anneal and clean in the usual way. 2 in. diameter will be the size. This metal is rather thick for the size of the disc so it may be necessary to saw it with the fret saw. In any case it is always advisable to cut out a square first if the use of shears is preferred. It is then an easy matter to round the corners into a circle. File the edge smooth and emphasise the centre with the divider point, as this must not be lost. The plate will look more pleasant if it is very slightly domed and this allows the handle to project away from the drawer when fitted. It must be realised that a quick and easy access to the handle is the primary factor regardless of whatever shape it may be. There is no need to dome the plate on the sandbag or wood as in the case of the tea strainer; too much fullness is not suitable since it is for screwing on to a flat surface. Draw compass lines round its convex side as a guide and planish with the flat-faced hammer on to the stake, Pl. II, Fig. 3. The plate will automatically become curved as the edge is reached. Anneal again and clean. Take a mallet and with its wedge end, mallet the edge flat on the surface plate, Fig. 5, Pl. XIX. Divide the circumference into eight equal parts and draw a pencil line between each point and the centre. These lines will guide the filing of the edge. Mark two more points on the edge, each $\frac{1}{8}$ in. from the radial lines. Nick these with a three-square file and shape as shown in Fig. 6. Draw another circle $\frac{1}{4}$ in. from the edge and with the curved tracer chase the lines forming the shape, shown shaded in Fig. 6. Draw a circle with dividers $\frac{3}{8}$ in. in diameter in the centre of the plate. Drill a $\frac{1}{8}$ in. hole through its centre. Saw out a small disc of brass of the same thickness as

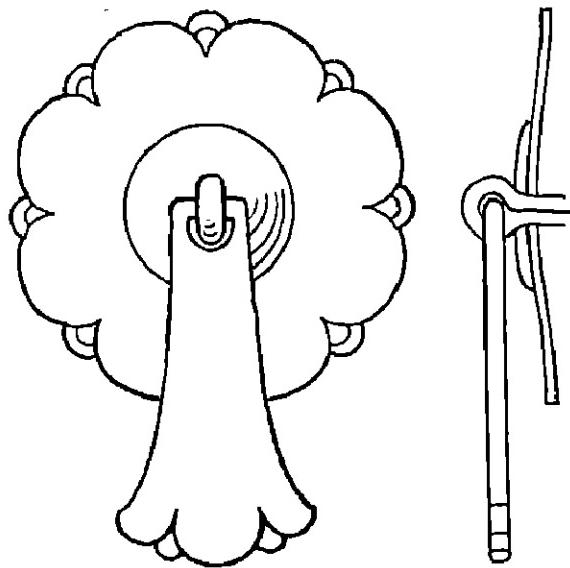


Fig. 1

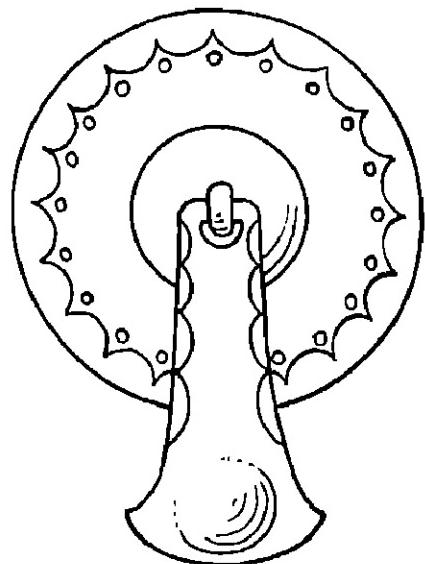


Fig. 2

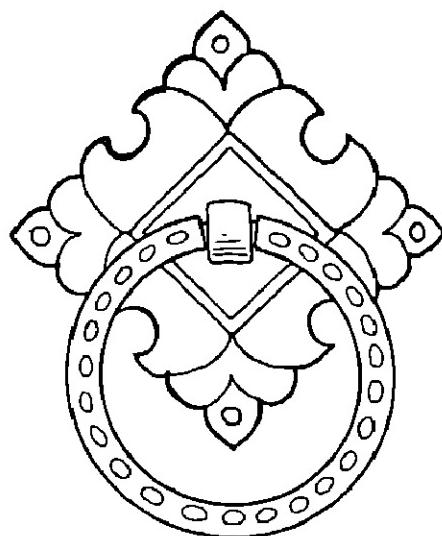


Fig. 3

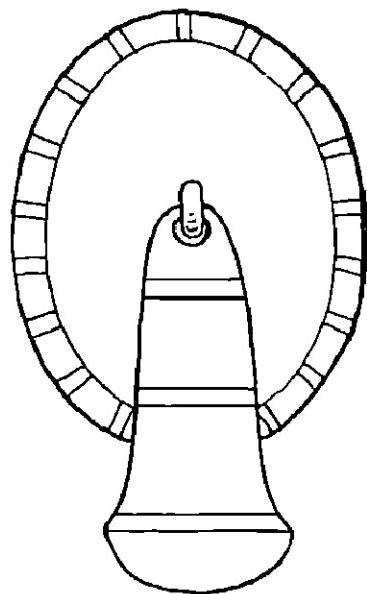


Fig. 4

PLATE XVIII.—DESIGNS FOR A DROP HANDLE

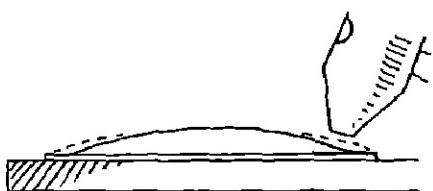


Fig. 5
Flattening the edge of plate



Fig. 10
(a) Shaping the hole for the loop
(b) Shape of top of handle

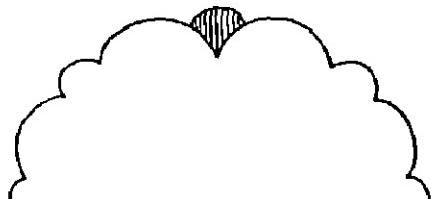


Fig. 6
Filing the edge of plate

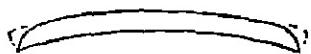


Fig. 7
Rounding the corner of disc

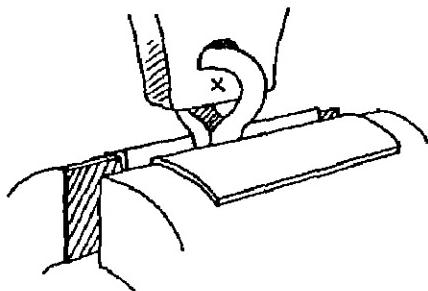


Fig. 11
Shaping the loop

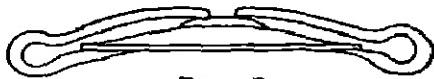


Fig. 8
Disc in position for soldering

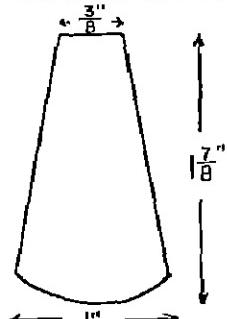


Fig. 9

Setting out the handle

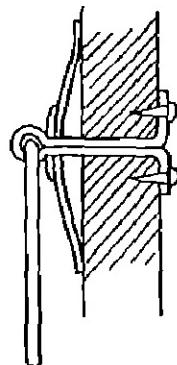


Fig. 12 Fixing of handle

the plate and well round its top edge (Fig. 7) and planish, producing a curve similar to that of the plate. Emery cloth the centre of the plate and underneath the small disc, and secure the latter centrally to it with binding wire (medium thickness) or cotter pins. Bend the pins to the shape shown in Fig. 8, so that they will well grip the disc. Borax and easy solder. File and stone smooth. Reverse the plate and drill through the centre of the disc with the drill used before. Drill the four screw-holes.

Handle.—This is made out of $\frac{1}{8}$ in. brass sheet $1\frac{3}{4}$ in. long by $\frac{1}{8}$ in. wide. Hack saw the long sides to the shape of Fig. 9. Shape them with a half-round rough file and finish with a smooth one. File all edges round and well emery cloth. (It is important that the handle should present no sharp edges or corners. Remember that it has to be gripped firmly and pulled.) Shape the end of it by filing and chase the lines as before. Drill a $\frac{1}{8}$ in. hole at the narrow end $\frac{1}{8}$ in. from the edge, taking care to centre-punch it accurately leaving an even thickness on either side. File that portion of the hole nearest the end of the handle flat (Fig. 10a) and round the section marked X, (Fig. 10b). The handle is now ready to be fitted to the plate and should be well polished beforehand. It is attached by means of a length of half-

round wire passed through the hole and looped round the section marked X. This is best done by squeezing the wire gently in the vice while attached to the handle (use vice clamps), Fig. 11. If the drop handle is not to be fitted to a drawer for some time, the attachment can be temporarily clipped behind the plate. Normally, of course, the two wires are passed through the wood and screwed to the back, Fig. 12.

Figs. 2, 3, and 4, Pl. XVIII, show other designs. The handle of Fig. 3 is domed on the wood block before shaping. The decoration of the handle of Fig. 4 is filed.

TEACHING HINTS

Handle.—This need not necessarily be solid. It may be made in the form of a ring either circular or oval of stout brass wire with a filed or punched decoration. The ring could be hammered slightly flat to give another section. Alternatively, the handle may be made in wood, filed up and cast in brass. This would allow of a much thicker metal than would be possible if made in sheet.

Plate.—Avoid irregular and meaningless shapes; or fussy and elaborate ones. There must be unity of design between plate and handle.

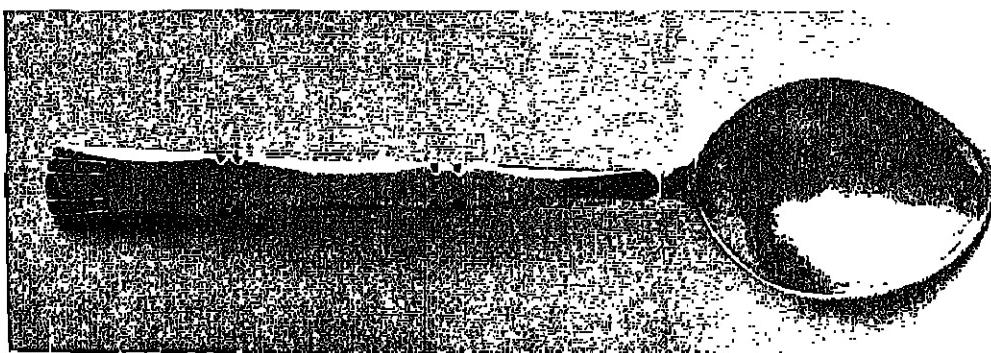


FIG. 6. SPOON

XI. SPOON

The evolution of the English silver spoon provides a most interesting study. Fine examples of these may be seen in the Victoria and Albert Museum and a small booklet is obtainable from the Museum at a cost of 7d.

The spoon to be made in this Section is shown in Fig. 6.

Stem.—Saw from a length of brass strip $\frac{3}{8}$ in. wide by $\frac{1}{8}$ in. thick, a piece 7 in. long. File the ends straight and taper the strip down to $\frac{5}{16}$ in. by using a large rough flat file. (See Section IV.) Divide this lengthwise into four spaces as shown in Pl. XXI, Fig. 7, and file to shape. The pointed end will be soldered to the bowl. With a round needle file, file the decoration marked A and, using a 6 in. smooth file, move the spaces between them (B) on the top edge of the stem only, Fig. 8a. Shape the top of the stem by filing and chase the decoration, Fig. 8b. File the under side of the pointed end round and taper its thickness to a spear point. This will be shaped to fit the bowl later.

Bowl.—This is beaten into a wood block as in Section IX. The depression will be egg-shaped instead of circular and will be $2\frac{1}{2}$ in. long by $1\frac{7}{8}$ in. wide. The deepest part of it will be cut near the extreme width, Fig. 9. Cut out an oblong of sheet brass 22 S.W.G. $2\frac{3}{8}$ in. long by $2\frac{1}{4}$ in. wide. Mark on this with the scribe the largest egg-shape possible and cut to this line with shears. Begin the hollowing round the edge with the ball-pane hammer and work towards the centre. Do not allow the edge to buckle unduly. After a shallow depression has been obtained, anneal and continue until the bowl is the required depth. Anneal again and clean. Planish with the flat-faced hammer on a suitable stake. (The mushroom stake may do, but the one thing to avoid is using a stake which is too flat. It is much safer to choose one with a steeper curve than a

straighter one, Fig. 10.) Care must be taken to retain the difference in curve along the major axis of the bowl. For this reason it may be necessary to change the stake for the straighter curve, though it is advisable to keep to the same stake or head if possible. A perfectly straight edge to the bowl is not desired as it will look hard and uninteresting, so file to a gentle curve, Fig. 11. This point was mentioned in making the caddy spoon. The bowl is now ready to be soldered to the stem.

Soldering bowl to stem.—Mallet the pointed end of the stem on a curved stake to the shape of the bowl, Fig. 11. To make a clean and sound joint is the most difficult part of this lesson and much will have been learned. To hold together these two parts with binding wire is not a successful method, moreover cotter pins are unsuitable. The best way is to place a piece of coke on the hearth brick; upon this rest the bowl upside down so that its deeper end is more or less horizontal, Fig. 12. Borax the bowl and stem and place the latter in position with its wider end resting on the hearth brick itself. Gently heat the joint until the borax has subsided. Meanwhile, hold in position with an old file or any suitable thing. Place several panels of solder along the joint and solder in the way already described. Neatly finish as before. The stem may look more pleasant if it is very slightly curved backwards—mechanical rigidity in a thing of this sort is more often than not most undesirable. Clean up and polish. Pl. XX provides further suggestions.

TEACHING HINTS

The handling of the spoon must be considered in this section. Avoid sharp edges on the stem and bowl; the latter must obviously be smooth and well polished.

A coarse planishing of the bowl—resulting in large facets—would be decidedly unpleasant to the mouth. Use the small flat-faced hammer, Fig. 3, Plate 4.

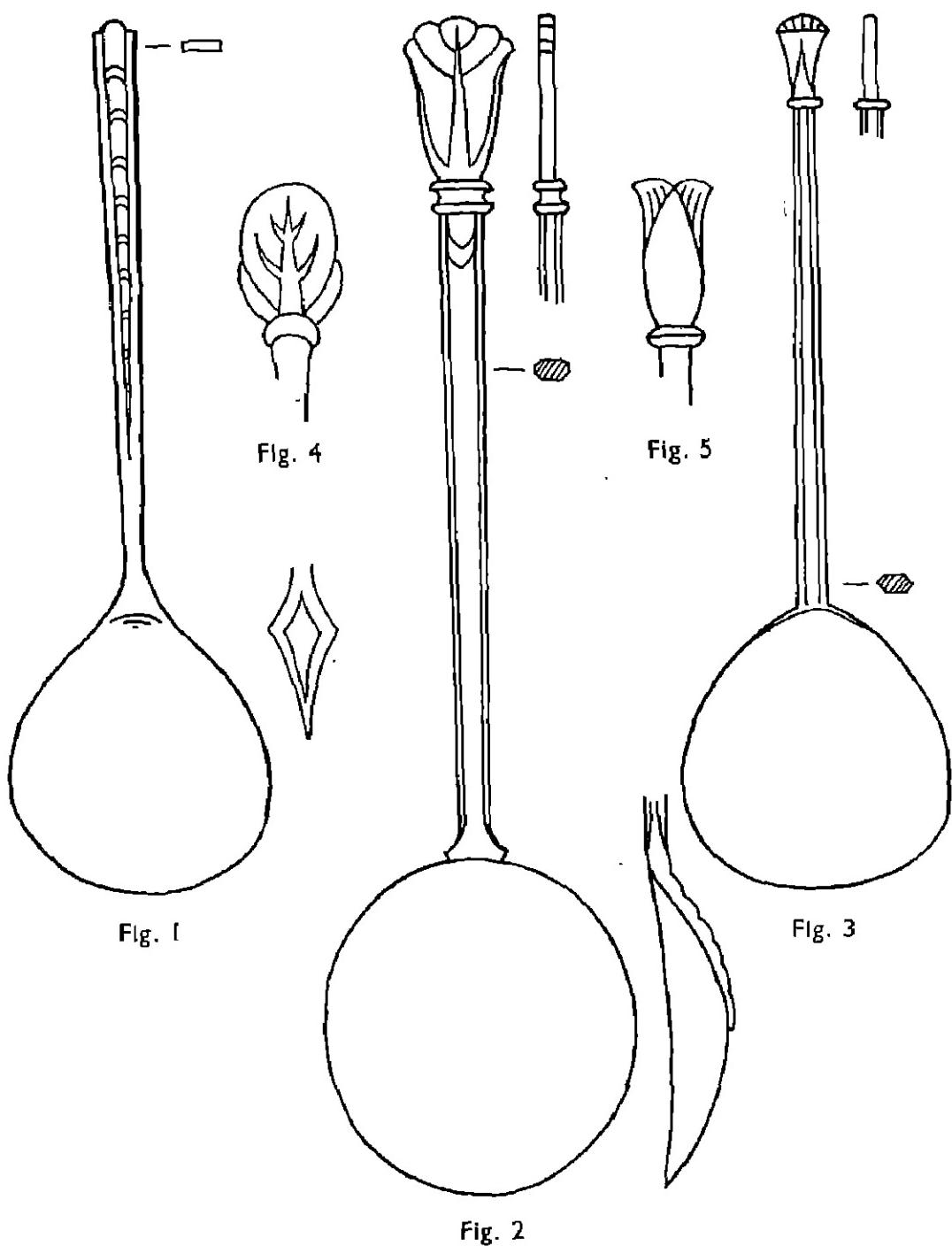


PLATE XX.—SUGGESTIONS FOR DECORATING THE SPOON HANDLE

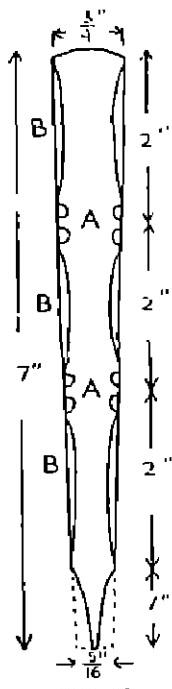


Fig. 7
Setting out the handle

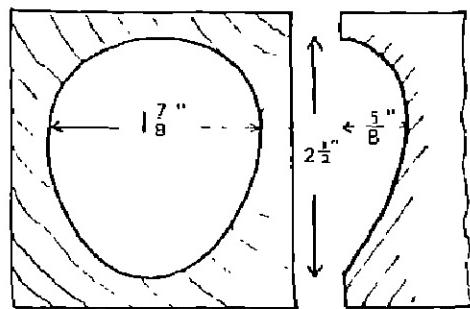


Fig. 9
Wood block for bowl

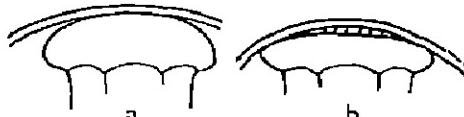


Fig. 10
(a) Right stake for planishing bowl
(b) Wrong stake

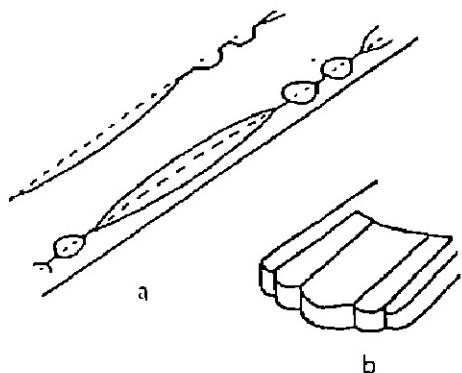


Fig. 8
(a) Filing the decoration
(b) End of handle



Fig. 11
Shaping the top of bowl

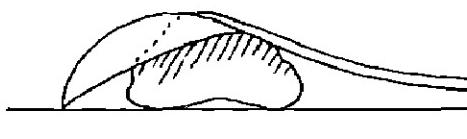


Fig. 12
Position of spoon for soldering

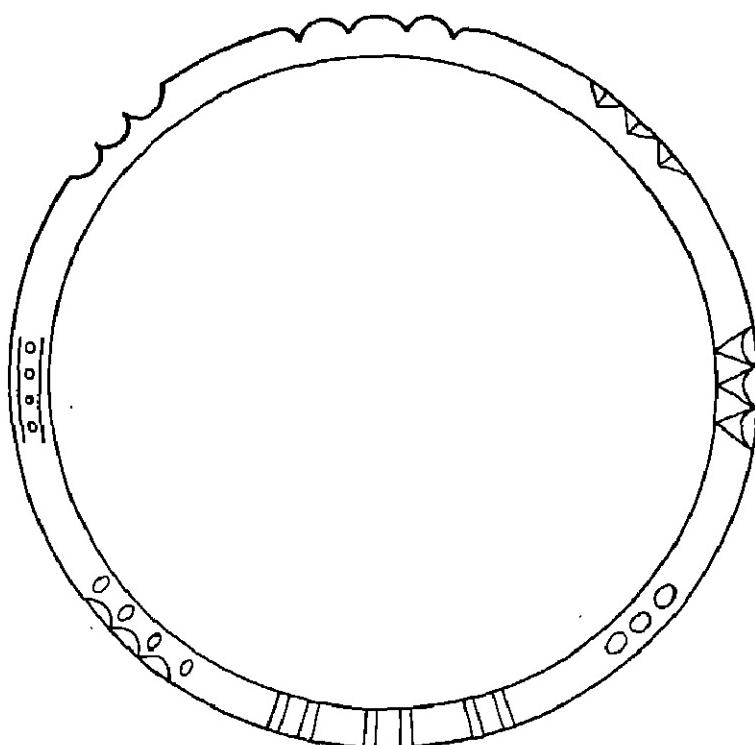


Fig. 1

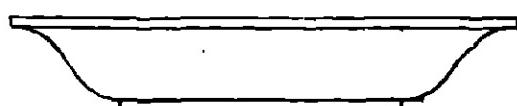


Fig. 2

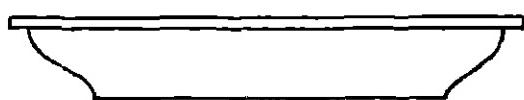


Fig. 3

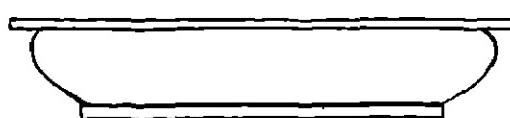


Fig. 4

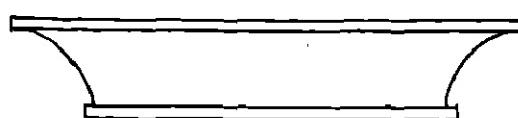


Fig. 5

PLATE XXII.—SMALL TRAY

XII. SMALL TRAY

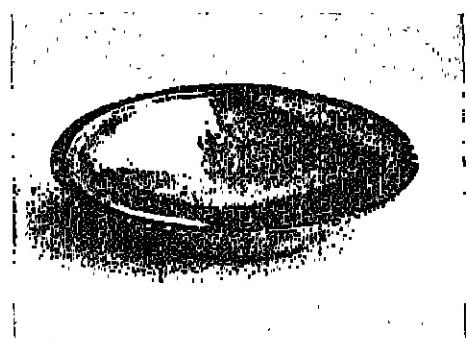
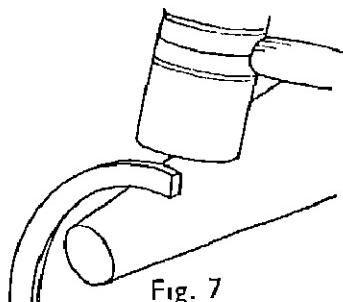
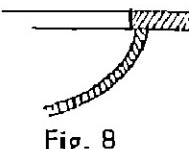
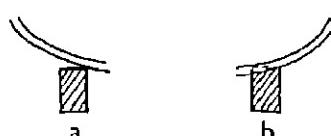


FIG. 6. A SMALL TRAY

The making of this tray (Fig. 6) gives practice particularly in fitting and soldering a foot or base to a shallow bowl, and the making and decoration of a rim.

Bowl.—Cut out a disc of gilding metal 22 S.W.G. $3\frac{1}{4}$ in. in diameter. Anneal and hollow this in the doming block—mentioned in the section on equipment—until the required depth is obtained; approximately $\frac{1}{4}$ in. Anneal again and planish on the stake (Pl. II, Fig. 3) working to the guidance of compass lines as before. After planishing concentrically it is a good plan to hammer lightly a second time from the centre radially. This ensures an even curve in all directions. With the dividers, mark a line as near the edge as possible and cut true with the shears. Rub down on the emery board until the top is perfectly flat. Test the roundness of it by drawing a circle on paper a shade larger than the diameter of the bowl. Place the bowl on the circle and irregularities will soon be seen.

Rim.—Cut off a length of oblong wire (gilding) $\frac{8}{16}$ by $\frac{1}{16}$ in. Assuming that the diameter of the bowl is $3\frac{1}{4}$ in., the length of wire will be approximately 13 in. Anneal this wire if necessary and mallet it circular on the mandrel, (Pl. III, Fig. 2). Some difficulty will be experienced because of the fact that the wire is bent edgeways and not

Fig. 7
Bending the rim of trayFig. 8
Section of trayFig. 9
a) Section of foot before bevelling
(b) After bevellingFig. 10
Wiring on the footFig. 11
Decoration of rim

on its width, Fig. 7. Periodically mallet it flat on the surface plate until the wire is both circular and flat. Now place it on the bowl. Its inside diameter should project a mere fraction beyond the thickness of the bowl (Fig. 8) and unless both the bowl and rim are perfectly circular the fitting will look unsightly. When the correct size is obtained, gently part the ends and file flat. Close them up again by springing them together and hard solder the joint as in Section V. Pickle and file smooth. Emery cloth the edge of the bowl and one side of the rim, and wire together as in Fig. 9, Pl. XVII. Solder with easy solder in the same way.

Foot.—Oblong gilding wire is also required for the foot of the tray but not quite so wide as for the rim. Say $\frac{1}{2}$ by $\frac{1}{16}$ in. Bend this up as before so that its long sides are vertical instead of horizontal. The outside diameter will be 2 in. Hard solder it and mallet flat. Hold the wire in position centrally on the bowl and it will be seen at once that there is a space between the outside of the wire and the bowl, Fig. 9a. The inside corner of the wire must therefore be filed off with a half-round file so that the edge is flush with the bend, Fig. 9b. Draw a circle with compasses $2\frac{1}{2}$ in. diameter on the outside of the bowl and wire the foot in position with binding wire as already explained, Fig. 10. Providing the outside diameter on the foot is exactly 2 in. there will be a margin of $\frac{1}{16}$ in. all round it between its outside edge and the circle which is merely used as a guide to enable the foot to be placed centrally. Borax and easy solder. The panels of solder should be applied to the outside of the foot and not inside. A general rule in soldering is that it must be done where easy access to filing is had. Obviously it would be impossible to file surplus solder away if it were put inside the foot. File, emery cloth, and stone the joint.

Decorating the rim.—The decoration of the rim is a simple filed one (Fig. 11) done

with a three-square and half-round needle file in six groups. Fig. 1, Pl. XXII, shows a number of different filed decorations—quite simple, but sufficient. Figs. 2, 3, 4 and 5 show four alternative shapes for the tray. These may be attempted after the Sections on hand raising and shaping have been studied.

XIII. TEAPOT STAND

Something has already been said in regard to the technique of saw piercing in Section VII but very little has been said about design. This Section will introduce the pupils to a much wider field in this direction. (See *Teaching Hints*.)

Saw out a circular piece of $\frac{1}{16}$ in. brass 5 in. in diameter. Divide its circumference into six equal parts and draw a straight line between each point. Saw off the surplus metal thus converting the disc into a hexagon. File accurately and flatten the plate on the surface plate with a mallet. Scour with pumice as before.

Fig. 1.—The decoration shown in this figure is really a combination of geometrical and conventionally treated leaf forms produced merely by piercing more or less semicircular holes or voids in different sizes. It is really astounding how an apparently complicated pattern is only the result of the putting together of a number of extremely simple units. The chased lines give an added interest to the otherwise plain spaces between the holes and actually are responsible for making the pattern read as a conventional leaf pointing inwards. Draw on a piece of thin paper the triangular shape formed by one side of the hexagon and two radiating lines shown as dotted lines, and also the design starting with the semicircular. Notice how these diminish in size towards the centre. Next draw the veins of the leaf—the semicircles form the serrations—and gum this section to the metal which has previously been divided up into six triangles. Drill a small hole in each shape

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shown shaded (Fig. 1) and saw pierce. Repeat in every triangle. A most important point to observe is to keep the ties strong (marked X on Fig 1). If they are reduced to

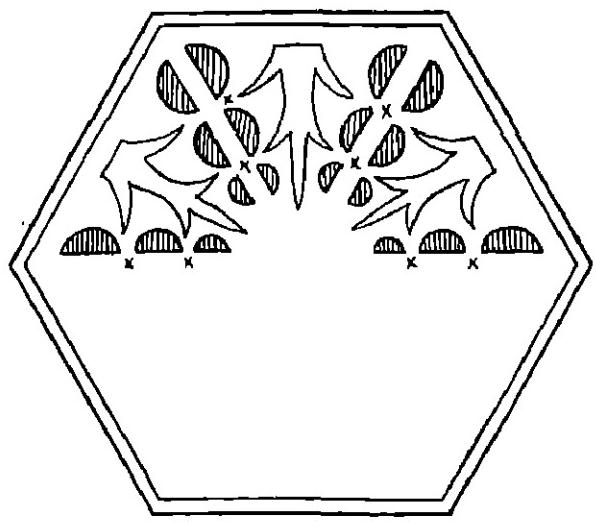


Fig. 1

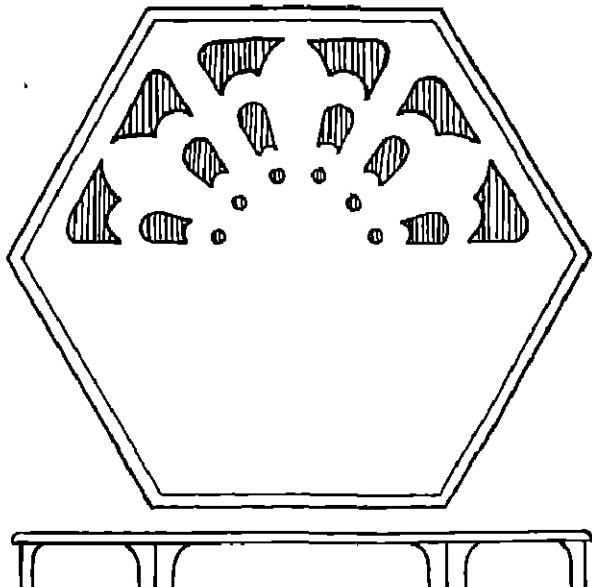


Fig. 2

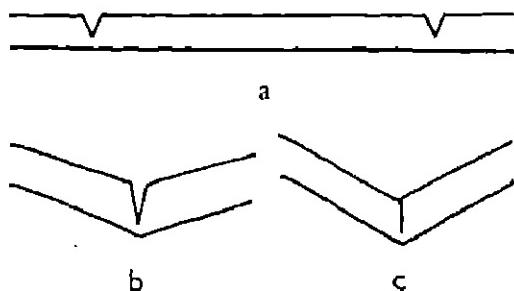


Fig. 3
Three stages in bending the rim

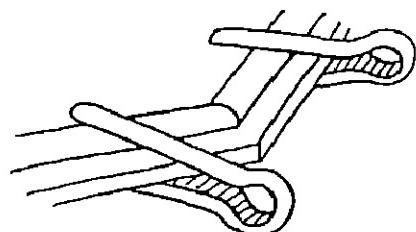


Fig. 4
Fixing rim to plate

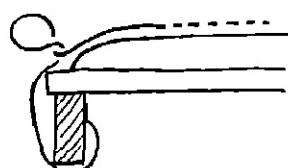


Fig. 5
Wiring foot to plate

a very thin attachment they will break off. (A saw piercing must be strong beyond anything else.) True up the edges with suitably shaped needle files.

Edging with wire.—Take a length of half-round brass wire about $\frac{1}{32}$ in. across the flat and measure along it—after flattening with mallet—six distances equal to the sides of the hexagon. To get a sharp bend the best way is to file the inside of each corner with a three-square file, Fig. 3a. Take care not to file the wire right through. Bend the wire at each corner to the required angle (b and c). File the two ends of the wire at an angle but do not solder for the moment. Draw a hexagon on paper and shape the wire accurately to it. Hard solder the joint and corners and fit the wire to the plate of metal, leaving, if possible, a slight projection between the wire and the edge of the plate, Fig. 4. The soldering will now be easier. Use cotter pins for fixing.

Strip soldering.—In previous lessons, soldering has been done by means of panels. This is a good method but very slow, though best for the beginner. It is really the jewelers' method because of the smallness of their work. Strip soldering is by far the quicker and more satisfactory way of soldering work of a fair size. We will employ the strip method to the soldering of the wire to the plate. From the sheet of easy silver solder cut with the shears a strip about 6 in. long and $\frac{1}{8}$ in. wide. See that it is free from grease or dirt by rubbing with emery cloth. Borax the wire, and plate and gently heat them; at the same time hold the solder with a pair of small iron tongs in the flame, having boraxed this also. Care must be taken that the solder does not melt too soon and drop in lumps on the work. Remove it for a moment. As the metal reaches the right temperature for soldering apply the solder to the joint. It will soon melt when it must be withdrawn and applied again in the same way. Avoid putting too much on the work; it is far better to apply it more

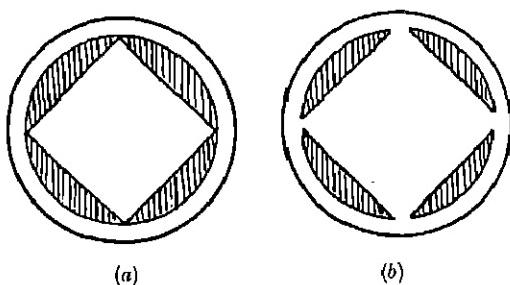
often and with a mere touch. Pickle and file the surplus edge away.

Making the foot.—This is made from oblong wire $\frac{1}{4}$ by $\frac{1}{16}$ in. in section, and made into a hexagon with its long edge vertical. File the inside of the wire where the corners occur and bend as before. Solder the joint with hard solder (using the strip) and easy solder the corners. Wire the foot to the plate with binding wire and clip the ends underneath the feet, Fig. 5. Stand the plate on the hearth brick upside down and easy solder. The foot may be made to either fit flush with the edge of the plate, or smaller to leave a projection. File and polish. Fig. 2 shows another design of the top and another suggestion for feet. These are made from $\frac{1}{16}$ in. brass, bent at the correct angle and shaped with a file.

TEACHING HINTS

Piercing.—Explain to the class the most important factors concerning pierced metal work. These are:—

1. A thick gauge of metal is essential for an object which has to stand the weight of something heavy.
2. The ties must be strong and hold together.
3. Draw on the blackboard the two following diagrams. Point out the omission of ties in (a) and the strong ties in (b).



4. Voids must be evenly distributed throughout the design and be pleasant in shape.

XIV. SMALL RAISED BOWL

This section introduces the principles involved in hand-raising a bowl out of a flat disc of metal.

Raising.—Raising is a hand-shaping process whereby a bowl or similar vessel is produced by means of contraction. It is always applied

As long as it is discovered what metal is capable of doing under a raising mallet the object of this lesson will have been reached. The bowl is roughly 4 in. in diameter and $1\frac{1}{4}$ in. deep, but it is necessary to estimate the size of the blank disc with which to start. A general rule is to take the average diameter of the bowl and add to it its vertical height. $5\frac{1}{4}$ in. then will be the size



RAISING A BOWL

to the outside of the vessel as distinct from "hollowing," which is a process of stretching from the inside.

Fig. I illustrates the hemispherical bowl described in this section. The question of accuracy will not be stressed here because the technique of raising and the observance of the possibilities of metal under such a process is, at the moment, the chief concern.

of the disc of metal. 22 S.W.G. copper will do well. Cut out this disc and file its sharp edge away. Sharp edges are dangerous to the hand when raising. Mallet flat on the surface plate after inspecting the surfaces for blemishes, etc. Scour with pumice and wet rag and dry. Mark the centre clearly with the divider point. With the centre just marked underneath hold the disc in the

doming block and hammer round the edge with the doming hammer, Pl. IV. With pencil compasses draw several concentric circles from the same centre, the first one about 2 in. in diameter; each succeeding circle being 1 in. greater in diameter than the preceding one. Hold the disc at an angle on the stake (Pl. II, Fig. 3) and with the wedge-shaped mallet, strike a blow just above the point of contact of the disc and the stake near the first circle, Pl. XXIII,

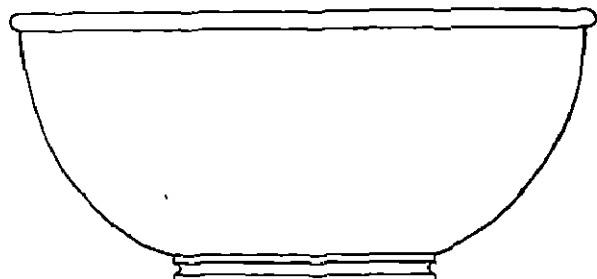


Fig. 1

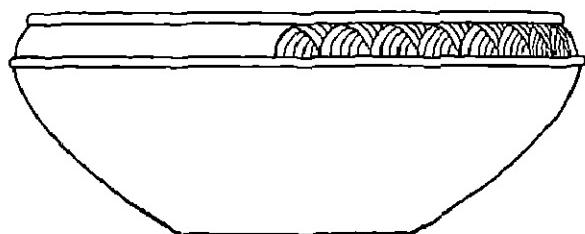


Fig. 2

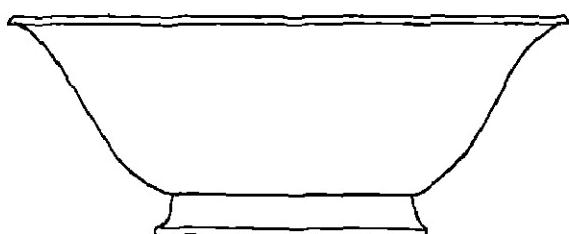


Fig. 3

SMALL RAISED BOWL

Fig. 4. Turn the disc round to the right and repeat the blow. It will be noticed that a dent appeared in the metal—in fact, as the work proceeds, a whole row of them will be formed in the shape of a continuous hollow groove. Complete the circumference and commence the next row a little higher up, but touching the row just done. The pencil lines act as a guide, thus keeping the mallet blows concentric and true, Fig. 5. When the edge is reached the first course of raising is finished, Fig. 6. Raising, then, is a succession of blows with the mallet—a hammer is often used—which compress the metal gradually producing a curved or rounded form. Anneal the disc and repeat the operation. After the second course it may be necessary to change the stake to that of Pl. III, Fig. 6. The more we curve or raise the bowl, the more round the stake must be. Anneal after each course until the required shape is produced, Pl. XXIII, Fig. 7. Mallet the bowl on the stake with the flat end to smooth and even the surface. Pickle and clean again and redraw the compass lines. Mallet the bottom, which up to now has been flat, round.

Planishing.—Planish with the flat-faced hammer turning the bowl round in the same way as in raising. This operation has been explained in previous lessons. Do not unduly force the bowl on to the stake but rather steady it and the point of contact will soon be found.

The foot.—Make a foot from a piece of oblong copper wire $\frac{3}{16}$ by $\frac{1}{16}$ in. as in Section XII and solder to the bowl. Hold together with binding wire, clipping the ends underneath the edge of the bowl.

Testing its accuracy.—It is now necessary to test the accuracy of the raising. Place the bowl on the surface plate and slowly turn it round. With the eye on a level with the top

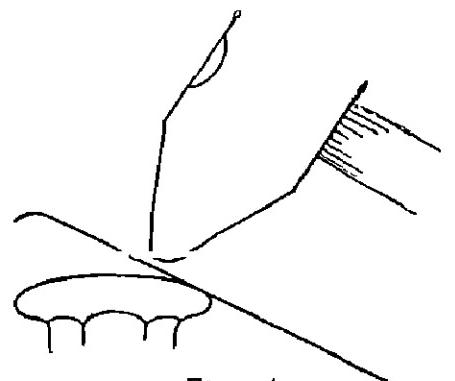


Fig. 4
Beginning the raising

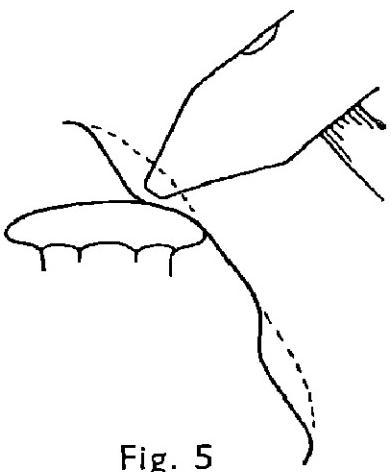


Fig. 5
The first course in raising

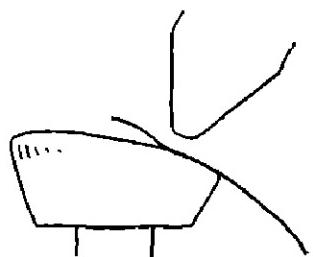


Fig. 6
Nearing the rim

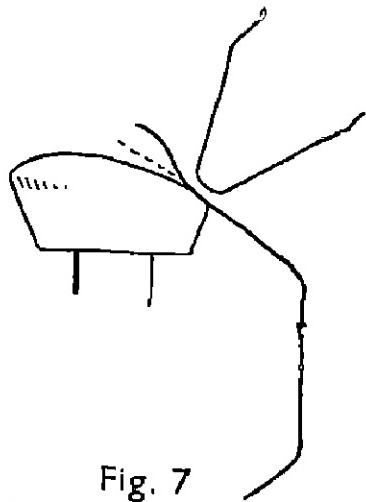


Fig. 7
"Taking in" the edge

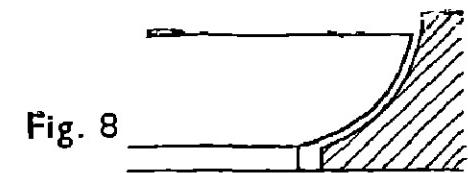


Fig. 8
Testing the accuracy of a
raising with a templet

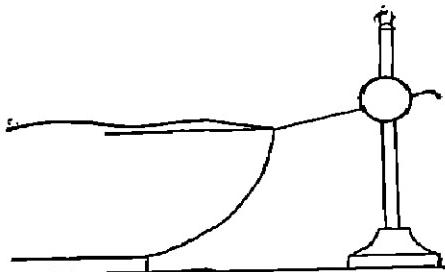


Fig. 9
Scribing a line round the edge

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of the bowl it will be possible to notice any radical irregularities in its shape. If the curve of one side is more straight than the other, it means that it has not been suffi-

course, need any truing up but the first attempt is bound to produce a raising not quite symmetrical. A surer method is to cut out a templet of thick metal to exactly the shape desired and revolve the bowl within it (Fig. 8) holding the templet vertically on the surface plate.

Mounting the wire.—Before the half-round wire can be soldered on it will be necessary to make the top of the bowl horizontal and in one plane. Set the pointer of the scribing block at such a height that when the bowl is turned round on the surface plate with the pointer touching the top edge, it will scribe a line as near to the lowest point as possible, Fig. 9. Cut the surplus metal away with the curved shears, and rub down on the emery board. Bend up a length of $\frac{1}{8}$ in. half-round wire on the mandrel a little smaller than the top of the bowl to allow for stretching and to make a tight fit. Hard solder the joint and mallet perfectly round. Fix it to the bowl with cotter pins about $\frac{1}{4}$ in. below the edge, Fig. 10. Borax and solder with the strip using the easy grade. Stand the bowl vertically on the hearth applying the solder to the narrow margin above the wire. File down to the wire and emery cloth, taking off the sharp corner inside. Fig. 2 shows a "turned-in" raising and Fig. 3 a "turned-out" one.

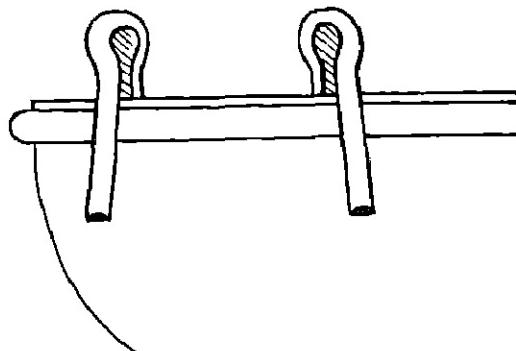
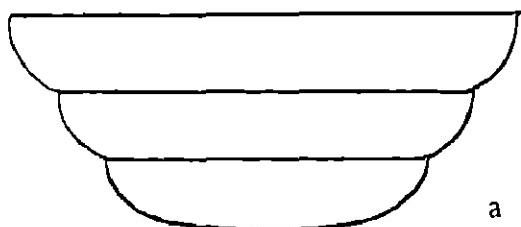
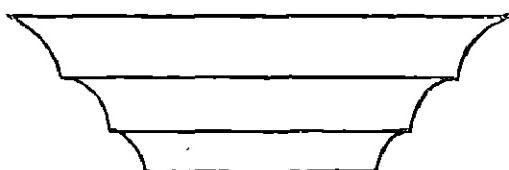


Fig. 10

Fixing the rim to bowl



a



b

Fig. 11

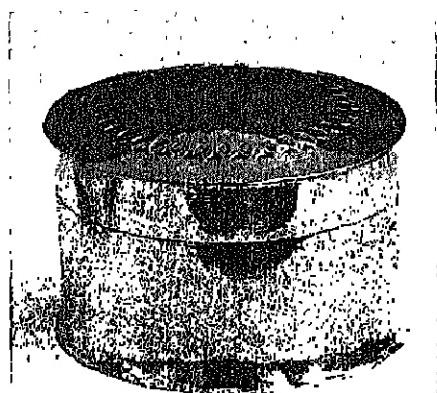
ciently raised at this point. This can be easily remedied by using the mallet again at this particular part and hammering smooth. An accurate raising does not, of

TEACHING HINTS

Raising.—Draw on the blackboard Figs. 1, 2, and 3 as good examples of a raised shape and explain that their suitability lies in their simplicity of curve. Draw two unsuitable shapes such as Fig. 11, a and b, and tell the class that these shapes would only lend themselves rightly to the process of spinning.

Solder.—Make some distinguishing mark on each grade of solder so that they are seen when cut up into long thin strips. It can prove fatal to use the wrong grade by mistake.

XV. CYLINDRICAL BOX



CYLINDRICAL BOX

This section is studied solely for its wide range in soldering, and the hammering of a cylindrical object.

The body.—Cut a strip of 22 S.W.G. gilding metal which will bend into a cylinder 3 in. in diameter and 2 in. long. File both ends perfectly straight and at right angles to its sides. Tap the ends lightly with the corner of a flat file to help the solder to grip, Pl. XXV, Fig. 8. Bend the strip over the large mandrel (Pl. IV, Fig. 2) and secure with binding wire, Pl. XXV, Fig. 9. Borax inside and out and solder with the hard solder. It is a good plan to tilt the cylinder with a few pieces of coke underneath; this allows the heat to get to the outside as well as the inside. The seam may be brazed alternatively. Brass solder requires much more heat than silver solder and there is a danger of melting the metal, but there is no doubt that brazing is stronger. This is applied to the work in the same way as strip solder and can be obtained in wire form about $\frac{1}{16}$ in. thick. File off surplus solder and planish. (See Section V.) With the collet hammer (Pl. IV, Fig. 1) curve out one end of the cylinder on the mandrel, Pl. XXV, Fig. 10. Cut out a disc of the same metal

a little bigger than the larger diameter of the body and planish on a flat stake (Pl. II, Fig. 5) commencing in the centre. Planish lightly otherwise the disc will become curved. Wire to the body and solder with easy solder. Take the precaution of wiring the body again to prevent the seam from opening, Pl. XXV, Fig. 11.

The lid.—Cut another disc $2\frac{1}{4}$ in. diameter and dome on the doming block or wood block to a depth of $\frac{3}{8}$ in. Planish on a suitable head. Mallet the edge flat. Place the box on the surface plate and scribe a line round $\frac{1}{2}$ in. below the top edge with the scribing block. Place the box in the vice lightly between two pieces of wood and with the back-saw saw a gap about $\frac{1}{4}$ in. long on this line, Fig. 12. This perforation allows the hot air to escape whilst soldering on the lid. Wire the domed lid to the body and solder using easy solder again. (Do not pickle at this stage.) Continue the gapping right round the body until the two parts separate. Rub both sawn edges on the emery board.

Bezel.—It is obvious that the lid cannot be held in position unless a bezel—a narrow strip of metal—is fitted inside the top edge of the body. Cut a strip $\frac{3}{16}$ in. wide, bend it up, and round it on the mandrel so that it fits tightly inside the body. Take a half-round file and bevel the top inside edge of the cylinder, Fig. 13. If the top edge is left horizontal, the solder will prevent a close fit of lid to body. Hard solder the joint of the bezel. Insert the bezel about one-third of its depth and easy solder. (Take the precaution again of wiring the body to prevent the seam from opening.) The box is now finished except for filing up neatly and polishing. The disc of metal forming the bottom can now be sheared off flush with the flanged side of the box and emery-clothed. Stoning may be necessary. Avoid filing or stoning the hammered surface if possible. The lid will look perhaps better if a slight projection is left on the edge; not more than $\frac{1}{32}$ in. Thin edges are never

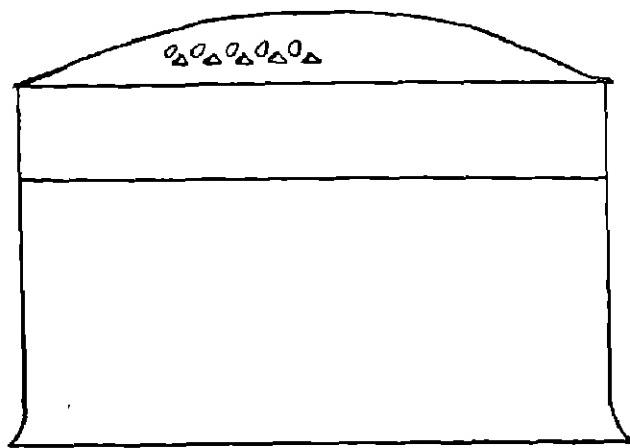


Fig. 1

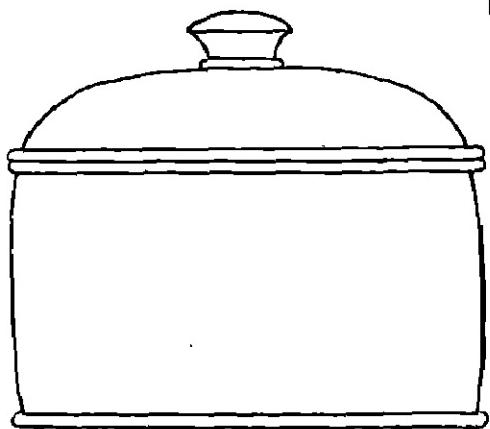


Fig. 2

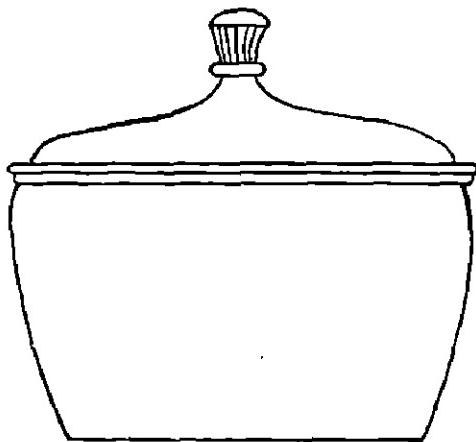


Fig. 3



Fig. 4

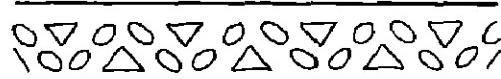


Fig. 5

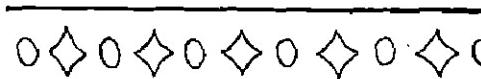


Fig. 6



Fig. 7

PLATE XXIV.—SUGGESTIONS FOR A CYLINDRICAL BOX

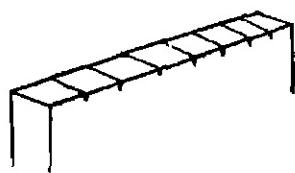


Fig. 8
Nicking the ends of the strip

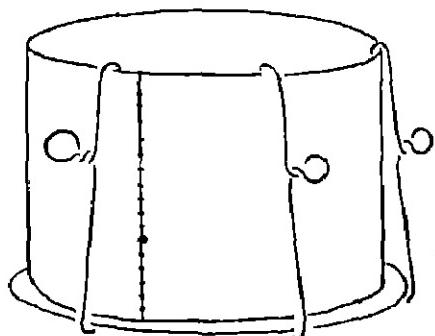


Fig. 11
Wiring the base for soldering

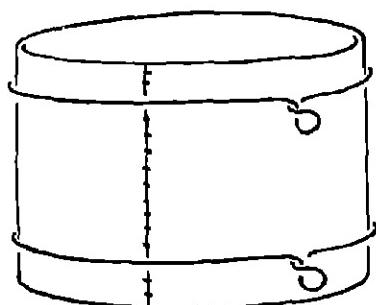


Fig. 9
Wiring the cylinder for soldering

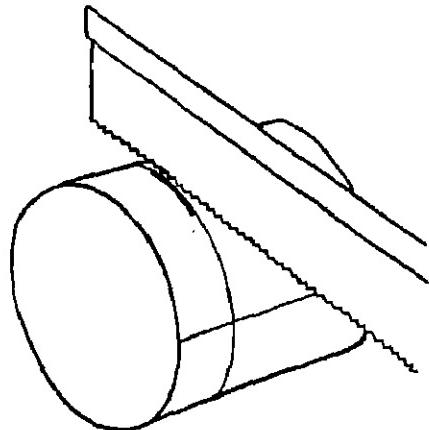


Fig. 12
Sawing a gap for the lid

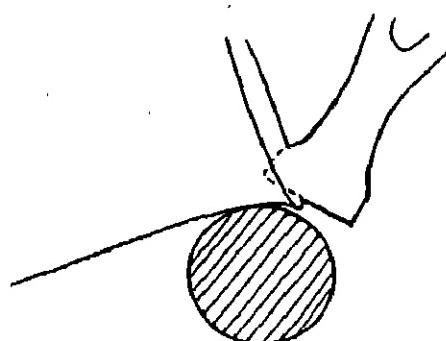


Fig. 10
Shaping the lip

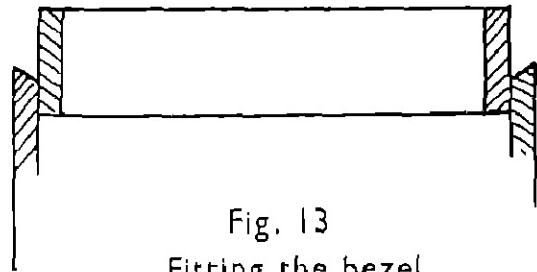
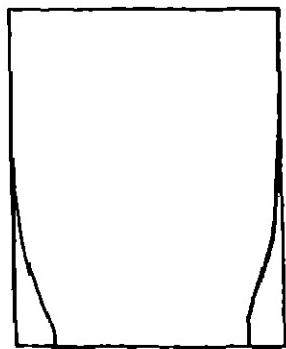
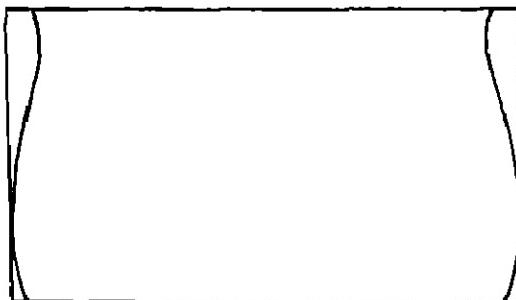
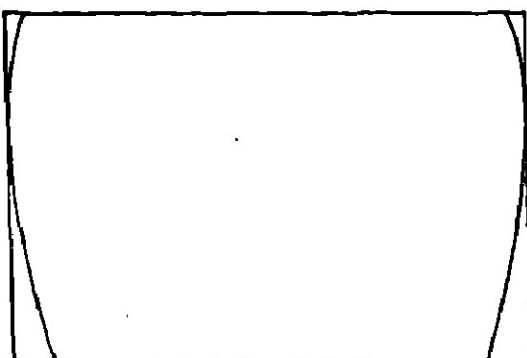


Fig. 13
Fitting the bezel

PLATE XXV.—STAGES IN THE MAKING OF A CYLINDRICAL BOX

pleasant to look at or handle. Polish with pumice and oil and finally with tripoli.

Decoration.—This is done with two punches—an oval and a triangular one. Fig. 4 shows an enlargement of this tool pattern. The lid is filled with chasers' pitch, allowed to set and stuck on a pitch bowl.



SHAPING OF CYLINDRICAL VESSELS

Two circles are drawn the width of the pattern with pencil compasses and the tool is struck with one blow of the hammer. Alternatively, the lid may be held on the stake on which it was planished; this would call for the services of another person, though it is possible for one person to hold the lid and punch the pattern at the same time. The punches are made from cast steel rod as in Pl. XII. Figs. 4, 5, 6, and 7 show suitable tool patterns.

TEACHING HINTS

Shaping of cylindrical vessels.—Draw on the blackboard several rectangles of varying proportions. Show that by means of a slight diversion from their straight lines, pleasant shapes can be produced. Those illustrated below may be found useful.

XVI. BEAKER

The shaping and soldering of a tapering cylindrical vessel is the aim of this section.



FIG. 4. BEAKER

Setting out.—The simplest method of determining the shape and size of the blank is as follows. Draw the elevation of the beaker on a piece of paper. This will be $4\frac{1}{2}$ in. high, $3\frac{1}{4}$ in. across the top, and 2 in. across the bottom. Cut this out with a pocket knife or scissors, place it on another sheet of paper and draw carefully round it. Now place it so that its left-hand side touches the right-hand side of the duplicate just drawn and draw round it again. Repeat this operation on the left and we have three elevations side by side. Draw by free hand a curve extending from point A to point D touching points B and C. Repeat this at the bottom of the elevations, Fig. 5. This is not an infallible method but it is sufficiently accurate for the purpose, and one that a youngster can do quickly and easily. Place this templet on to a sheet of 22 S.W.G. gilding metal and draw round it. Cut out with shears.

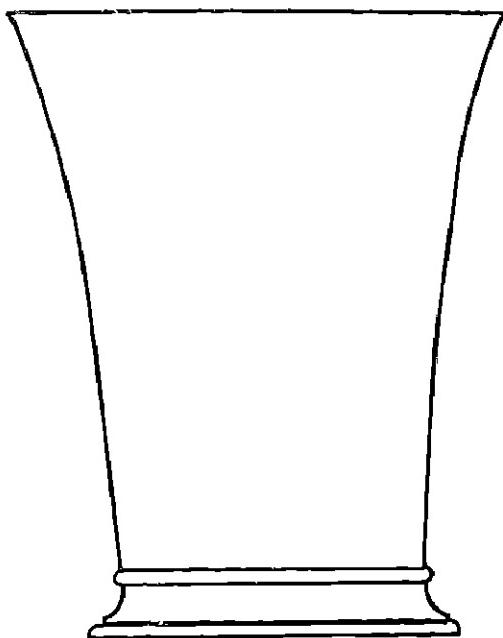


FIG. 2

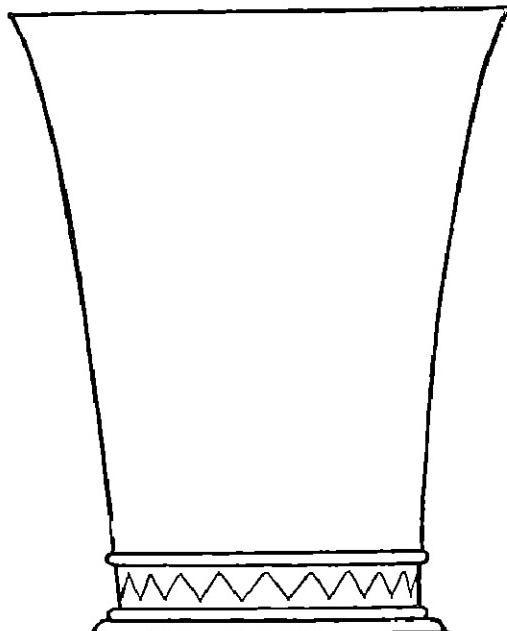


FIG. 1

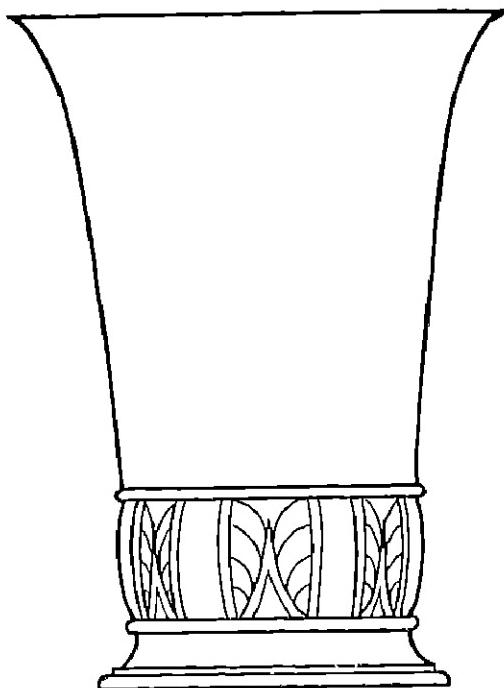


FIG. 3

PLATE XXVI.—DESIGNS FOR A BEAKER

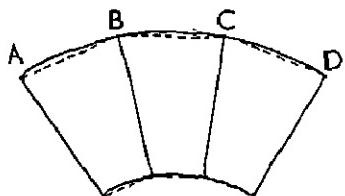


Fig. 5
Developing the body of the beaker

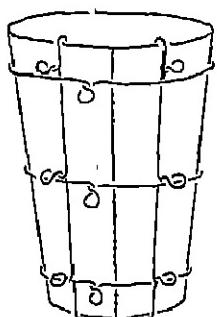


Fig. 6
Wiring the beaker
together for soldering

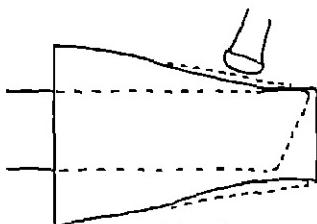


Fig. 7
Shaping the sides

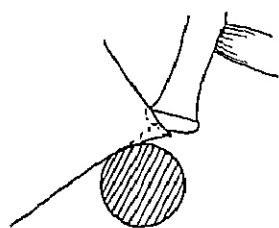


Fig. 8
Shaping the mouth

Shaping.—File the edges perfectly straight and test with the steel rule. Nick them with a file as in Section XV and bend the blank round the large mandrel. Spring the edges together by overlapping them one way and then the other and wire together as in Fig. 6. It will be discovered that horizontal wires alone are not sufficient to hold the seam together simply because of the fact that the sides of the cylinder taper; they will slip down towards the narrow end. This is counteracted by fixing three wires with three loops in each to the cylinder vertically and clipping their ends over the edges of it. The three horizontal wires are then placed over these so that they cannot slip down. Tighten these wires so that the edges of the cylinder touch. Borax inside and outside and either braze or hard solder. File any surplus solder away and lightly hammer on the stake (Pl. II, Fig. 1) until round. With the neck hammer (Pl. IV, Fig. 5) raise the sides of the beaker inwards starting from the narrow end turning it round as the work proceeds, Fig. 7. Leave the last $\frac{1}{2}$ in. of the wide end as this must later be turned outwards. Anneal carefully taking care not to open the seam. The mouth of the beaker may now be shaped by hammering the edge over the stake from the inside, Fig. 8.

Planishing.—Draw a number of horizontal lines round the beaker about $\frac{1}{2}$ in. apart along its whole length and planish with the same hammer. (A flat-faced hammer produces elongated marks on a round surface which are not altogether pleasant. Marks left by the neck or collet hammer are more round providing its face is not too curved thus giving hollow indentations which are even more unsightly than elongated facets.) The lip of the beaker is best planished from the inside as in shaping it.

Base.—Cut out a disc of the same metal $\frac{1}{2}$ in. greater in diameter than the base of the beaker. Lightly planish keeping it flat. Rub the base of the beaker on the emery board so that it stands on the surface plate

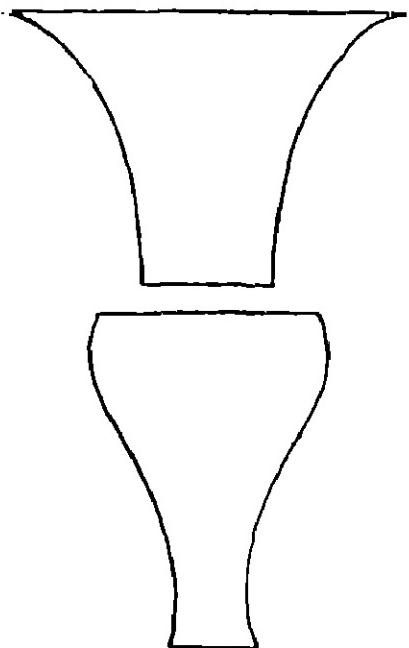
without rocking. Emery-cloth the edge of the beaker and disc and wire together. (See Section XV.) Solder with easy solder and file up smooth still retaining the projection. This will serve as a moulding between the beaker and foot.

Foot.—This is simply a thick oblong wire $\frac{1}{4}$ in. by $\frac{1}{8}$ in. bent up and made round on the mandrel. This should project $\frac{1}{8}$ in. all round the base of the beaker. File away the top outside corner to a curve. Bear in mind continually that all mouldings and edges of metal which are to be handled must feel smooth and shapely. If any decoration is needed on the base this should be done before soldering as there is always a danger of marking the surface of the metal with the file.

Figs. 1, 2, and 3 show possible treatments of the base.

TEACHING HINTS

Good proportion and shape.—Draw on the blackboard one or two good and bad



BAD SHAPES FOR A BEAKER

shapes for a beaker, and explain that a rightly shaped and good proportioned one will stand well and will not look as though it might fall over. Show by diagrams that the mouth of the vessel must not be too wide for the base. The bad shapes may be drawn as below.

XVII. DISH

The raising and hammering of a circular dish, the mounting of wires, and the making of a tapering foot are embodied in this section.

Bowl.—Cut out a disc of 22 S.W.G. gilding metal, the size of which will have been determined by taking the average diameter of the bowl and adding to it its height. Prepare the blank for raising. Draw compass lines round as explained in Section XIV and raise to the required shape and

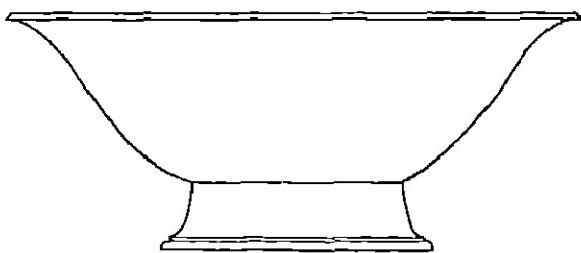


Fig. 1

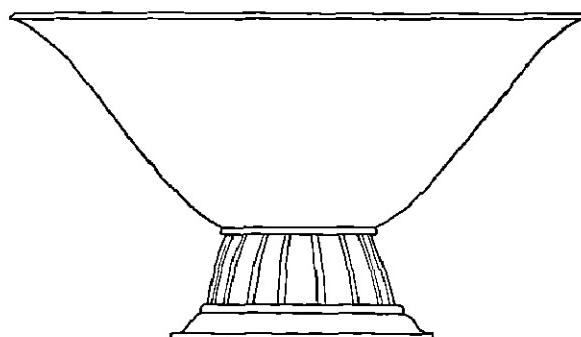


Fig. 2

ALTERNATIVE DESIGNS FOR A DISH

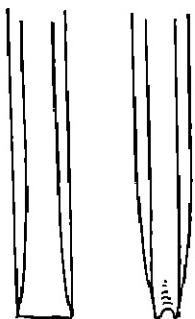


Fig. 3
Side and end elevation of tool

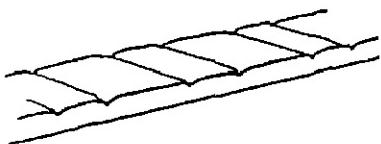


Fig. 4
Decorating the rim

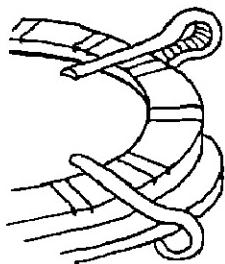


Fig. 5
Securing the rim

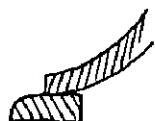


Fig. 9
Section of foot

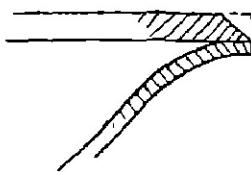


Fig. 6
Bevelling the rim

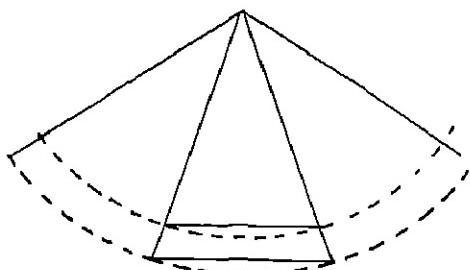


Fig. 7
Developing the foot

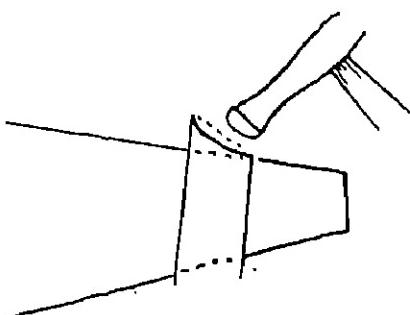


Fig. 8
Shaping the foot

size. This, when finished, should be 6 in. across the top and $1\frac{1}{4}$ in. deep. Mallet the edge flat and planish with a flat-faced hammer which has previously been polished bright. It may be necessary to replanish the edge from inside with the neck hammer.

Mounting the wire.—Flatten out a long oblong wire $\frac{3}{16}$ by $\frac{3}{32}$ in. This must lie perfectly flat on the surface plate. (A piece of 2 $\frac{1}{2}$ in. long would be a safe length.) This wire is to be decorated before it is mounted to the bowl. Make a tool out of $\frac{1}{4}$ in. cast steel square rod the shape of Fig. 3. The hollow groove is filed with a round needle file. Take a piece of scrap metal and with the tool resting on it strike a blow with the chasing hammer. We shall see that a double line has been punched. Mark along the whole length of the oblong wire distances of a $\frac{1}{4}$ in. Ask someone to steady the wire and proceed to punch the double line at right-angles to its length, Fig. 4. Anneal and bend the wire into a ring with its long edge horizontal and hard solder. If we have not a large mandrel to mallet the wire on to we must draw a circle on paper and round the wire to this. Do not forget to leave a narrow margin between the wire and edge of bowl. Emery cloth and secure the wire to the bowl with cotter pins, Fig. 5. Easy solder using the strip. Pickle and cut or file away the surplus edge. Bevel the end of the wire, Fig. 6.

Foot.—This will be made of thicker gilding metal, say 18 S.W.G. Determine the shape by setting out the elevation on paper and developing the other two sections as shown in Fig. 7. Cut the complete shape out and stick it on to the metal sheet. Trace round with the scribe and cut out. Use the curved shears for the inner curve. File the ends straight and tap with the file. Bend up and hard solder, employing the method of wiring as in Section XVI. Shape the foot with the neck hammer (Fig. 8) on the mandrel, and planish. Rub both edges flat on emery board and see that they are round.

Mount the wire on the bottom of the foot with easy solder (Fig. 9) allowing about $\frac{1}{2}$ of it to project.

Mounting the foot.—Emery cloth the bottom of the bowl where the foot is likely to touch. Draw a circle on it a shade larger than the smaller diameter of the foot. Wire the foot to the bowl and easy solder from the outside. It will be found necessary to heat the inside of the foot as well as outside. This will draw the solder through making a sound joint. Before soldering the foot to the bowl it is most important to see that the top of the bowl and the foot are in one plate. Place on the surface plate after wiring and test with the scribing block. The foot can be moved slightly to remedy any fault which may be there. Round the outside edge of the bottom wire and well emery cloth. Polish with pumice and oil.

Fig. 2.—This is a similar dish in most respects. The foot is made up of two parts, however, a stem and base. The former is shaped on a curved stake or head, and the latter is really a shallow dome with its centre cut out.

TEACHING HINTS

The application of a piece of well-figured wood or ivory may be used to advantage in a dish of the description of Fig. 2. The stem between the bowl and foot could be made of one of these materials. A screw would have to be soldered to the bowl and passed through the wood or ivory. The three parts being held together by a nut.

XVIII. COVERED BOWL

The photograph (Fig. 3) gives a good idea of the finished bowl as seen in perspective. The simple tool pattern is extremely effective on an otherwise perfectly plain surface; there is just enough design to add interest. The filed decoration on the knob—again simple—gives enrichment to a domed lid.



FIG. 3. COVERED BOWL

(The semicircular shape underneath the knob is merely a reflection.)

Bowl.—This is raised and hammered as in Section XIV. 24 S.W.G. will be quite thick enough if made in gilding metal. Determine the size of the blank or disc by the method already described in Section XVII. When the bowl has been raised to a saucer-shape, the courses required for forming the sides of the bowl must begin abruptly at point X, Fig. 4a. Draw a circle with compasses $3\frac{1}{2}$ in. in diameter on the base of the raising and begin to take it in (Fig. 4b) with the mallet on the stake, Pl. II, Fig. 1. Continue the courses until the sides of the bowl are not quite vertical. Avoid a mechanically straight line by shaping on the round head of the stake. (Only a suggestion of a curve must be made.) Anneal and planish the base on the stake, Pl. II, Fig. 3. The corner may present some difficulty, but since it is not at all sharp this will be somewhat alleviated. The smaller head (Pl. III, Fig. 3) will be quite suitable. After planishing the corner, change the head for the one shown in Pl. III, Fig. 6 and continue to the top of the bowl, taking

care not to thin the edge by heavy hammering. The next thing is to strengthen the edge of the bowl. This is best done by soldering to it a half-round wire similar to that round the foot. A $\frac{1}{8}$ in. wire would look rather heavy whilst one half that thickness would be too thin. We must therefore draw the wire through a half-round draw-plate thus making it a shade less in thickness.

Wire drawing.—Take a length of this wire about 12 in. long and anneal it carefully. File about $1\frac{1}{2}$ in. of one end gradually to a point or nearly a point (Pl. XXVIII, Fig. 6) by holding the wire in the hand vice. The wire is now ready for drawing through the plate. The draw-plate will be seen to have

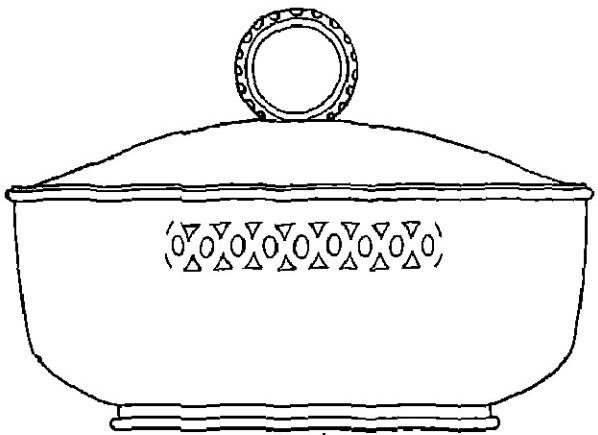


Fig. 1

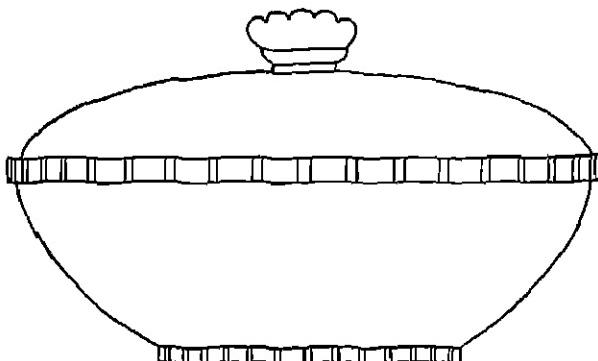


Fig. 2

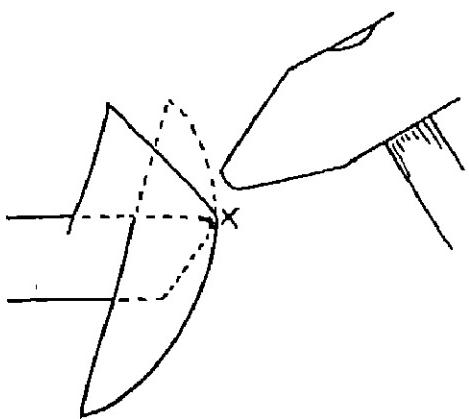


Fig. 4 a

(a) Position of bowl for raising

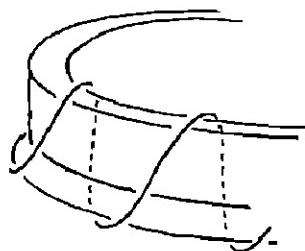


Fig. 5
Securing wire to foot

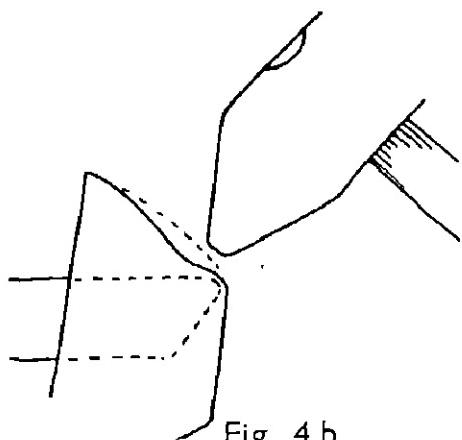


Fig. 4 b

(b) Straightening the sides



Fig. 6
Tapering Wire

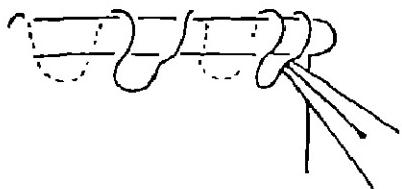


Fig. 7
Making firm the rim

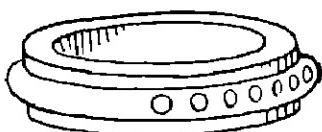


Fig. 8
Decorating the knob

PLATE XXVIII.—STAGES IN THE MAKING OF A COVERED BOWL



PLANISHING A BOWL
Note the compasslines for guidance.

a number of graduated half-round holes cut right through. If we examine the back we shall observe that the holes are much larger than those on the front. In short, they are tapered from back to front. The wire is always—quite obviously—pulled through in this direction. Screw the plate in the vice making sure that the vice jaws do not actually grip the holes, but beneath them. Push the pointed end of the wire through a hole which will allow this and no other part of the wire to pass through. Take a pair of draw-tongs—large iron tongs for the purpose—and gripping about $\frac{1}{2}$ in. of the point, pull it through still further. Loosen the wire with the tongs and grip again so that they hold about 1 in. of it and pull until the whole wire is drawn through the plate. Repeat this operation until the wire is the size

required. It will have become very hard during this process and must be annealed. Cut a suitable length off and make it into a ring that will fit tightly over the edge of the bowl. Hard solder the joint and fit to the bowl with binding wire, Fig. 7. The binding wire grips the edge in a series of loops inside and out. These are pressed firmly against the half-round wire with pliers. Borax well and stand the bowl inverted on the hearth brick (grooved side uppermost). Apply easy solder to the joint.

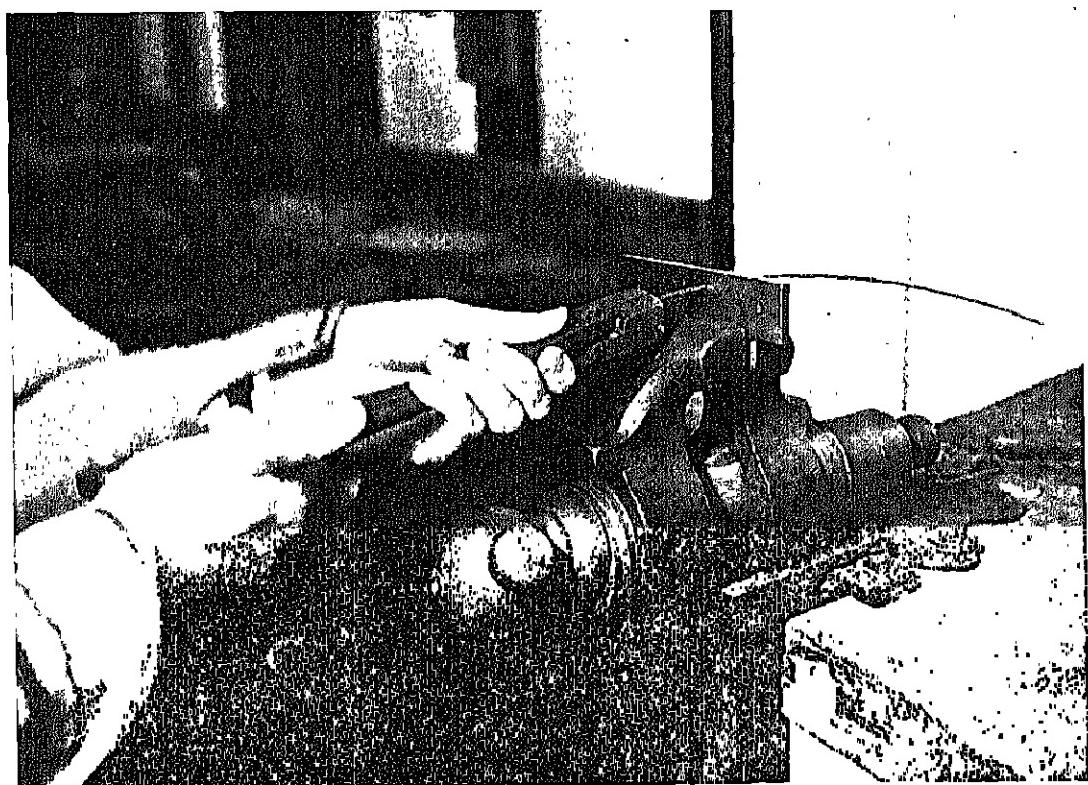
Foot.—This is in the form of an oblong wire approximately $\frac{3}{16}$ in. by $\frac{1}{8}$ in. bent into a ring $2\frac{1}{4}$ in. in diameter. Hard solder the joint and lightly hammer round. Now take a length of half-round wire (half the depth of the oblong wire will do) and make it into

another ring large enough to fit over the oblong wire. Hard solder the joint as before. Easy solder the two wires together holding them in position with binding wire, Fig. 5. Bevel the top edge of the foot and solder to the bowl.

Lid.—This is made of the same gauge metal as the bowl. Dome, planish and flatten the edges. Turn up a narrow oblong wire— $\frac{1}{8}$ in. by $\frac{1}{16}$ in. will be thick enough—so that it will fit inside the top of the bowl without being tight. Solder this to the underneath of the lid leaving a margin all round. This margin is very important as without it the lid would slip into the bowl.

Knob.—Make a ring out of a piece of oblong wire $\frac{9}{16}$ in. by $\frac{1}{16}$ in. with an inside

diameter of $\frac{5}{8}$ in. Hard solder the joint. Round the centre of this, solder a half-round wire, Fig. 8. File grooves round with a round needle file as a simple means of decoration or enrichment. It is advisable when soldering the knob to the lid to have the joint actually touching the latter so that the solder will prevent any possibility of its opening. Use easy solder for this. It is possible to hold the knob in position with binding wire but it is better to steady it with a pair of tongs while soldering. One panel of solder each side will be sufficient. See that the knob is held vertically. If the bottom of it is filed to the shape of the lid—that is, slightly hollow—it may stand up of its own accord without being held. Fig. 2 suggests another shape of bowl.



DRAWING WIRE THROUGH A DRAW-PLATE



FLATTENING THE EDGE OF A SHALLOW RAISING

TEACHING HINTS

An ebony or ivory knob either turned on a lathe or made from a thick flat piece would make an excellent and pleasing finish to the lid. If turned, a pin would be made to pass through it and screwed to the lid.

XIX. CHILD'S CUP

This is the first exercise where a handle is made and soldered to a cylindrical vessel. Here refinement of shape, rightness of proportion, and careful fitting are the chief factors in this lesson. Fig. 1 is the shape dealt with in this Section.

We will begin with a sheet of 22 S.W.G. gilding metal bent up to form a cylinder

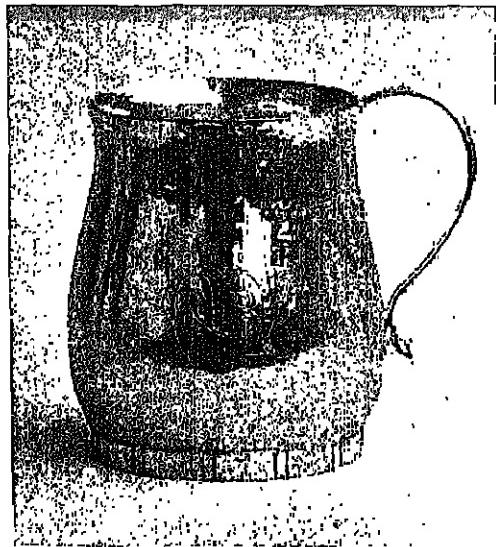


FIG. 3. A CHILD'S CUP

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3 in. long by $2\frac{1}{4}$ in. wide. Mallet round and hard solder as in Section XV. Do not planish at this stage. File the top and bottom straight and at right angles to the sides. Place on the surface plate and draw a line round $\frac{3}{4}$ in. from the bottom. Raise in the sides on the stake (Pl. II, Fig. 1) with the raising hammer starting on this line, Pl. XXIX, Fig. 4. Reduce the diameter of the top of the cylinder in this way to $2\frac{1}{4}$ in. Anneal and begin another course, easing off gradually as the top is reached thereby forming a lip, Fig. 5. The cylindrical end of the stake is best for this stage. Reverse the cylinder and raise in the bottom, Fig. 6. Anneal and planish the convex curve of the body, as we will now call it, with the flat-faced hammer and the concave curve with the neck hammer. The different hammer marks left by the two hammers must be merged into each other very gradually.

Base.—Cut out a disc of the same metal but a little thicker in gauge $2\frac{1}{4}$ in. in diameter. Slightly dome it and bevel its convex edge, Fig. 7. Also bevel the inside edge of the bottom of the body and hard solder the base to it, Fig. 8. Note the sharp edge left on the base. This is filed away after soldering. Hammer the seam with the flat-faced hammer until a curve is formed between body and base. The mushroom stake is used for this process, Fig. 9a. The convex base will become concave producing an outward curve instead of a hollow one, Fig. 9b. Planish the base all over.

Foot.—Bend into a ring an oblong wire $\frac{1}{4}$ in. by $\frac{1}{8}$ in. Hard solder the joint. The size of this should be such that when soldered to the body it covers the seam between body and base. Use easy solder. The vertical lines on the foot are filed beforehand as decoration.

Handle.—To estimate the length of the handle, bend a piece of binding wire to the shape of it on the full-sized sketch made at the commencement of the lesson. (Highly finished drawings are unnecessary except when dealing with very small objects.) Straighten the binding wire and this will be the length of the handle. Cut a strip of 18 S.W.G. gilding metal this length and taper it from $\frac{3}{8}$ in. to $\frac{1}{4}$ in. Flatten with the

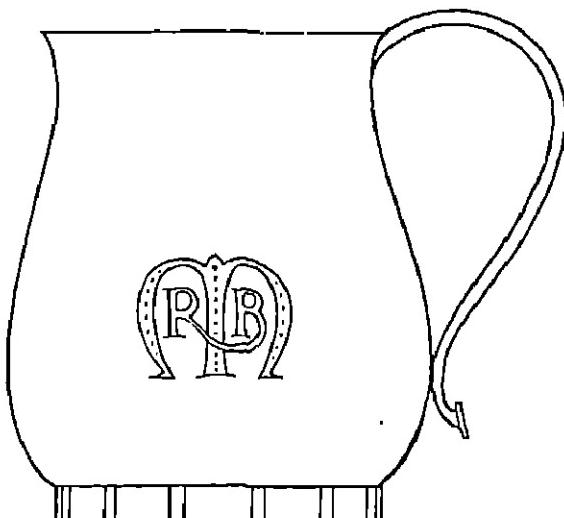


Fig. 1

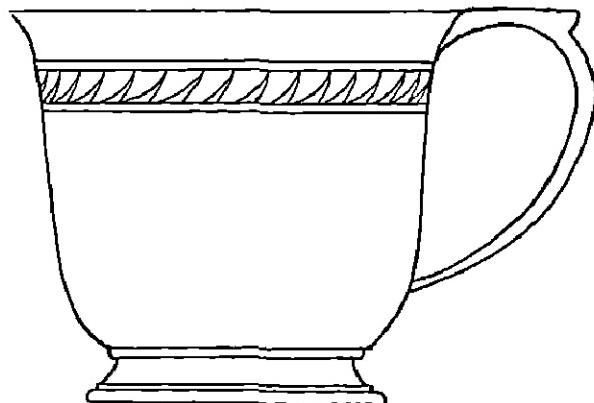


Fig. 2

CHILD'S CUP

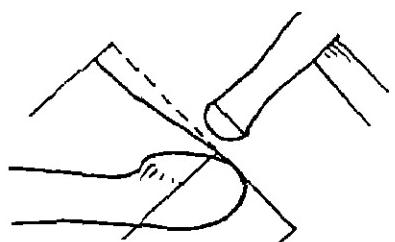


Fig. 4
Raising in the sides of the cup

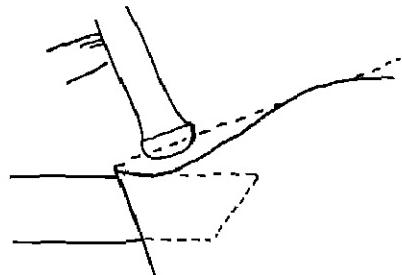
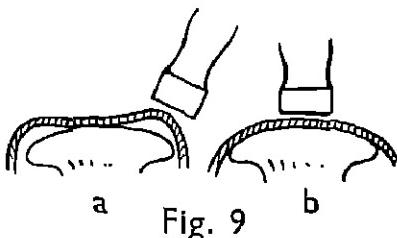


Fig. 5
Shaping the mouth of the cup



Fig. 8
Fitting the base



(a) Hammering the corner of the base
(b) Planishing the base



Fig. 10
Strengthening the handle with wires

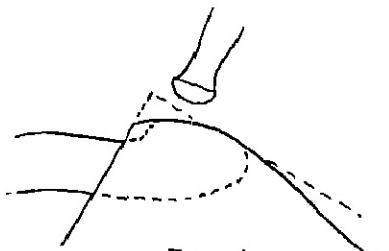


Fig. 6
Raising in the bottom of cup



Fig. 7
Bevelling the base

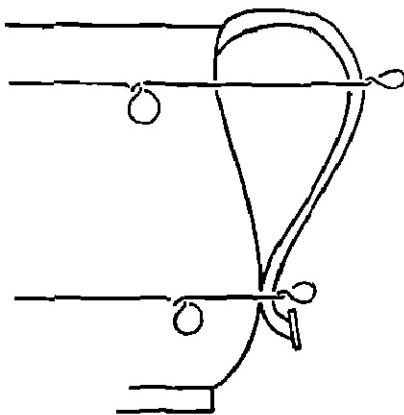


Fig. 11
Wiring handle to cup

mallet and lightly planish. It is obvious that this will be too thin unless it is thickened in some way or other. The following is one method. Take a length of half round wire about $\frac{1}{16}$ in. wide and cut off two pieces a little more than the length of the strip of metal. Make these perfectly flat and fit to each side of the strip with cotter pins, leaving a narrow edge, Fig. 10. Easy solder applying it to the outside of the wires. File away surplus edge. Cut the ends of the two wires flush with the strip and bend up to the required shape on a mandrel. The narrow end is curved the reverse way and has a small oval plate of metal soldered to it as a finish. Choose the seam of the body for the position of the handle and secure with binding wire making sure that the handle is vertical and at right angles, Fig. 11. Borax the two places where the handle touches the body and easy solder. (Panels are advisable here.) It is advisable to emery-cloth and polish the handle well before soldering; the inside, particularly, is difficult to get at after it is soldered up. Fig. 2 shows another possible shape for a child's cup. The monogram in Fig. 1 is chased after the cup has been filled with pitch.

TEACHING HINTS

The purpose of this object must be considered before making as, indeed, applies to all things which have to be used and handled. It must look strong and be made to stand a certain amount, probably, of misuse and careless handling. It need not necessarily be made from a cylinder. A raised shape would look equally well and the difficulty of seaming would be got over.

XX. ROSE BOWL

The raising and hammering of a fairly large bowl is the aim of this section together with the saw piercing of a lid of the same dimension. The foot provides no fresh problem.

The largest raising so far was the dish in Section XVII. This bowl will be raised in exactly the same way for the great part of its distance; the mouth being afterwards raised in to a lesser diameter than its widest part. Determine the diameter of the blank which will be made of gilding metal 22 S.W.G. by taking the average diameter of the bowl plus its height. 9 in. will be about the right size. Follow the instructions given in previous lessons until the bowl is approximately $7\frac{1}{2}$ in. across the top. The problem now is to raise in the last $\frac{3}{4}$ in. This is done on the raising stake Pl. II, Fig. 1. (See Fig. 3.) The raising hammer will be found more useful than the mallet for this operation. The base of the bowl has for the moment been kept flat to enable us to test the accuracy of the raising on the surface plate. To do this, draw a number of compass lines round the bowl about $\frac{1}{4}$ in. apart. Fix a pencil to the pointer of the scribing block and turning the bowl round horizontally, allow the pencil



ROSE BOWL

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to touch its sides so that the lines thus produced touch those of the compass. If these run parallel with each other the raising is accurate. On the other hand, if the scribing block lines come below the compass lines at any point, then the side of the bowl at this point has not been raised sufficiently. If the reverse happens, the raising has been too vertical. This method can also be applied to a form with concave sides. When inaccuracies have been remedied, lightly mallet the bowl all over thus smoothing the surface in preparation for planishing. The corner of the flat base can now be rounded on a suitable stake or head with a mallet, Fig. 4. Anneal and planish as before.

Foot.—Make this as in Section XVIII using 18 S.W.G. metal from a strip $3\frac{1}{2}$ in.

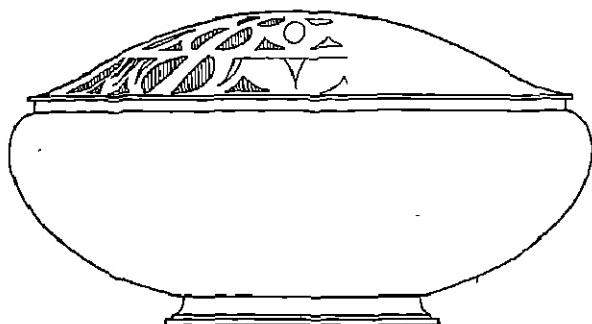


Fig. 1

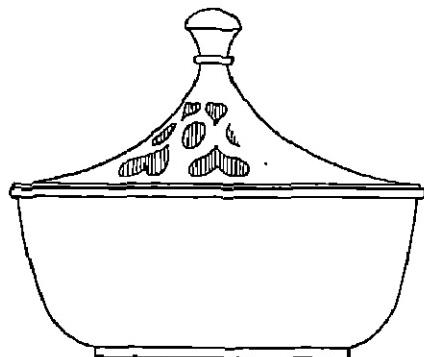


Fig. 2

Rose Bowl

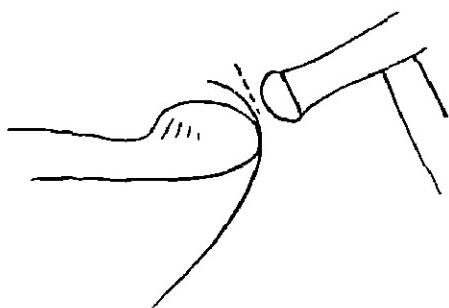


Fig. 3

Raising in the mouth of the bowl

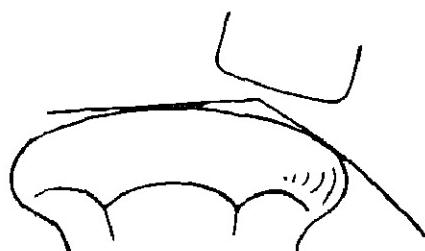


Fig. 4

Shaping the base

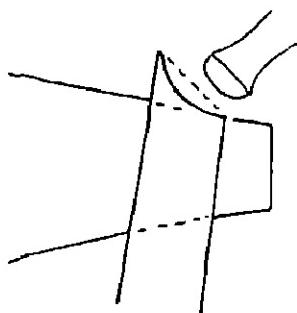


Fig. 5

Raising in the foot

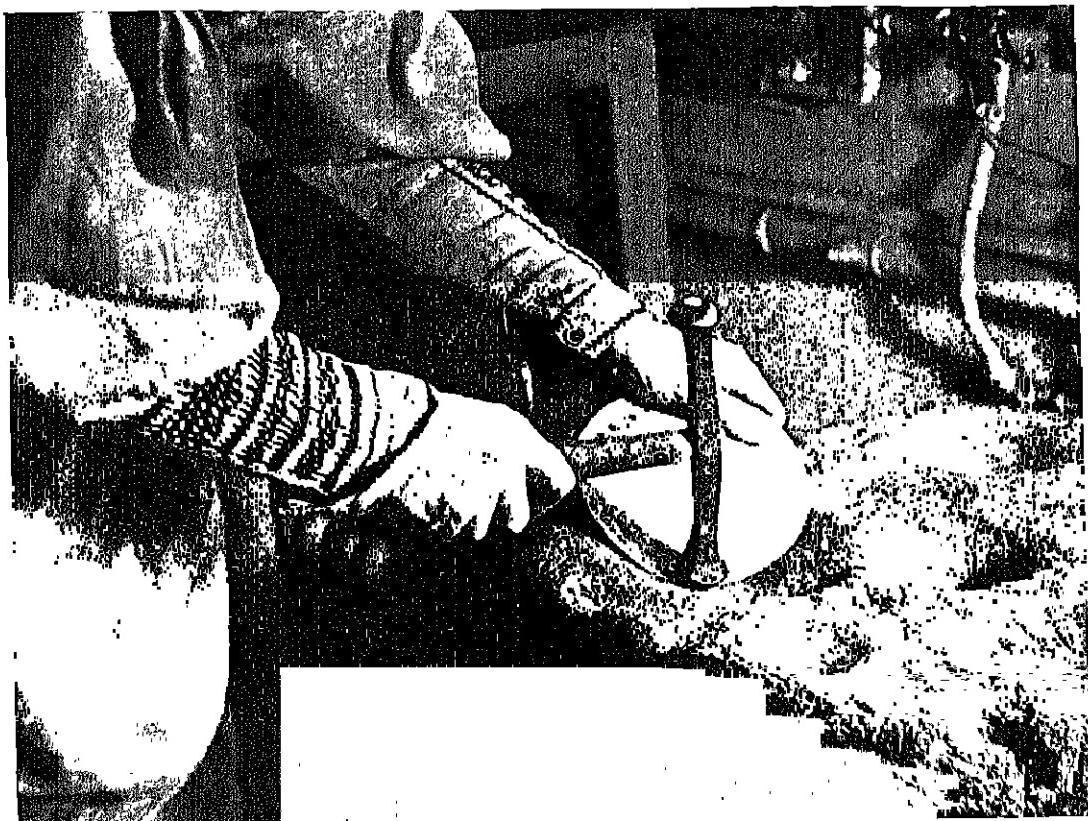
by $\frac{1}{4}$ in. Shape as in Fig 5 on the mandrel with the neck hammer. Planish and solder to it a thick oblong ring for the base as shown in Fig. 1.

Mounting the ring.—Bend up a ring of oblong wire $\frac{1}{8}$ in. deep by $\frac{3}{16}$ in. thick to fit the mouth of the bowl. The top of the bowl has, of course, been trimmed level and rubbed down on the emery board. The ring must fit tightly and held in position by its own pressure. About two-thirds of it should project above the edge of the vessel. Unless both the top of the bowl and the wire are perfectly circular, a good fit will be impossible. No appreciable space must show between the two, though a little opening will fill up with solder. Borax well and apply the easy strip

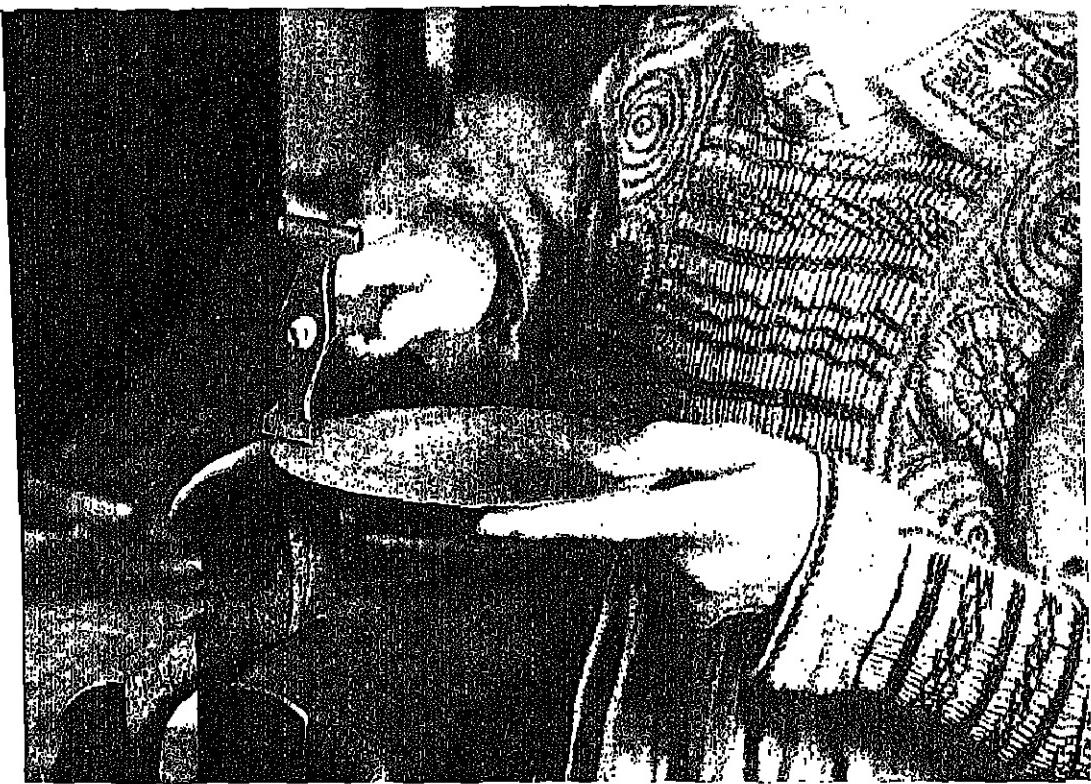
solder to the joint and file up neatly. Rub down on the emery board until flat.

Lid.—Cut out and dome a disc of 18 S.W.G. gilding metal and flatten the edge as in Section XV. Planish with a flat-faced hammer. Bend up another oblong wire $\frac{3}{16}$ in. deep to fit inside the rim of the bowl. This should fit loosely yet without any play. Solder this to the lid so that there is a margin of $\frac{1}{16}$ in. all round. See that the lid now rests flat on the surface plate. Trim the edge with a file so that it projects only a shade beyond the rim of the bowl. This affords a grip when removing the lid.

Saw piercing the lid.—So much has been said already about this process and it is unnecessary to repeat the marking out of



TURNING UP THE EDGE OF A BLANK IN PREPARATION FOR RAISING



PLANISHING THE INSIDE EDGE OF A LID

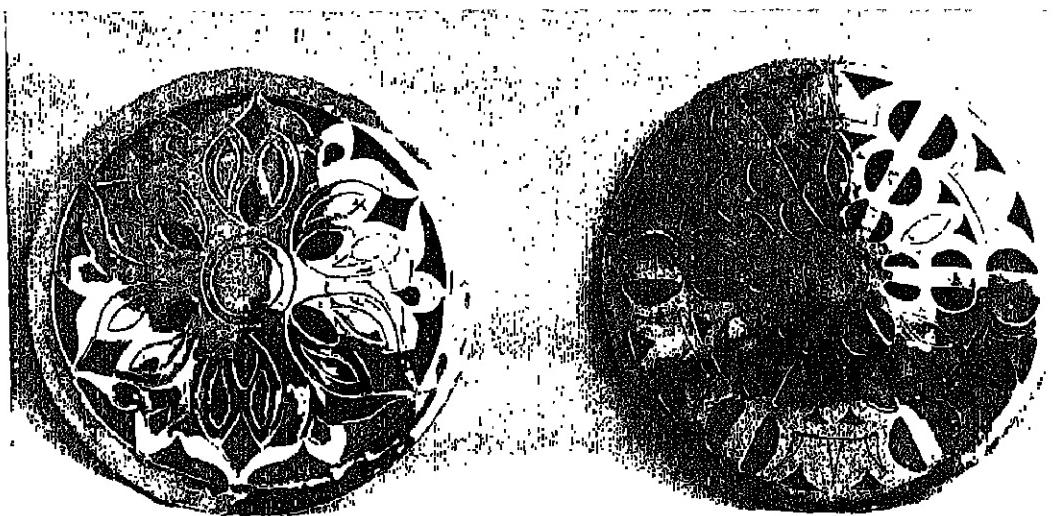


FIG. 6. TWO WELL-DESIGNED LIDS FOR A ROSE BOWL

the design, the drilling of a hole for each void, and the handling of the saw itself. Fig. 6 shows two excellently designed lids in plan. Notice that the ties are strong and the voids good shapes.

When the lid is finished and placed on the bowl it may show signs of rocking due probably to heating the metal unevenly. This can be overcome by painting the inside of the rim of the bowl and the outside of the rim of the lid with loam mixed with water to a thin paste. (Rouge will do if loam is not available.) Allow it to dry and place the lid on bowl. Wire them together with binding wire taking care that it does not cut into the surface of the metal or wires. Anneal but on no account over-heat it as this will melt the solder and result in the soldering together of the two parts. Remove binding wires and pickle clean.

XXI. TEA CADDY

The whole course so far has dealt with the making of flat and circular objects. It will be a change, therefore, to try to make something which is, say, octagonal on plan. Flat-sided vessels have been omitted purposely because of the difficulties they present to a young and inexperienced pupil. By this time, however, the pupils should have solved and mastered the various problems which have arisen from one lesson to another. The hammering of a flat-sided object is far from an easy task and requires great sensitiveness in the use of the hammer. Heating and soldering also, in this type of work, are not at all straightforward processes; flat surfaces—especially of any size—can go out of shape so easily and are not always possible to put right.

Make a rough drawing on paper of the tea caddy, striving for good proportion. There is undoubtedly less subtlety of form in a straight and flat-sided vessel than in a

curved one, so that much of its quality will depend on a right proportion of one part to another. Take the body of the tea caddy first. Obviously there must be some difference in dimension between its height and width. Things of equal proportion are rarely satisfactory and interesting. A brick

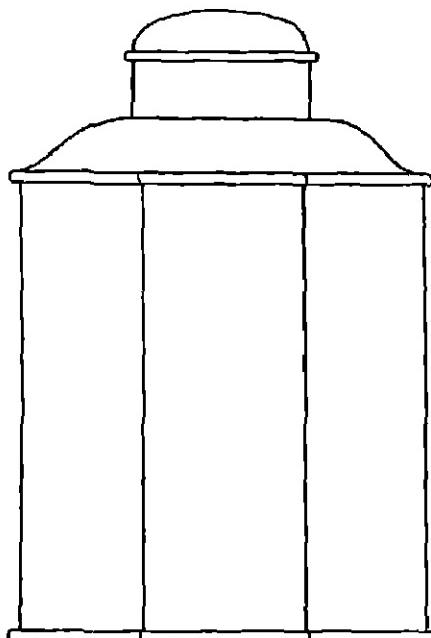


Fig. 1

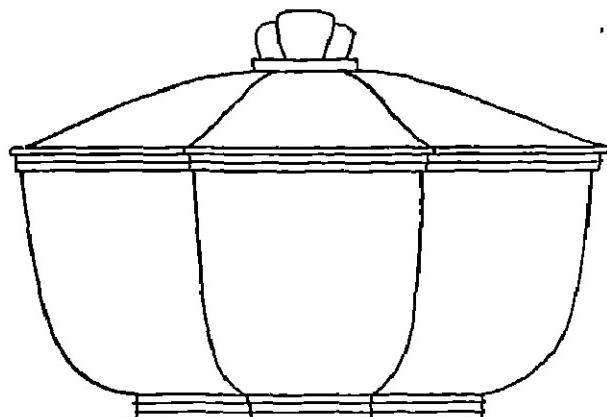


Fig. 2

TWO DESIGNS FOR A TEA CADDY

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is far more pleasant to look at than a cube. Decide to have the body greater in height than width—say 5 in. by $3\frac{1}{4}$ in. The neck is the next consideration. This too must be

interesting in itself and the right size for the body. $1\frac{3}{4}$ in. wide by 1 in. high would be about right. Now to solder a mere flat piece of metal to the top of the body and

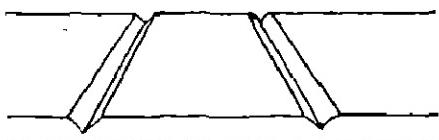


Fig. 3
The corners chiselled for bending

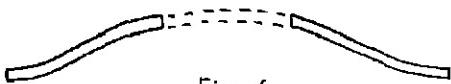


Fig. 6
Sawing out the top

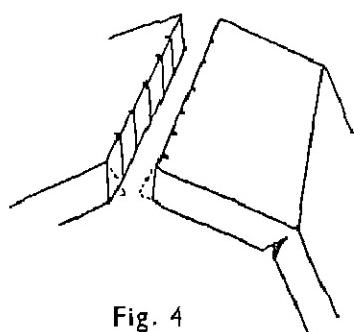


Fig. 4
Nicking the ends of the strip

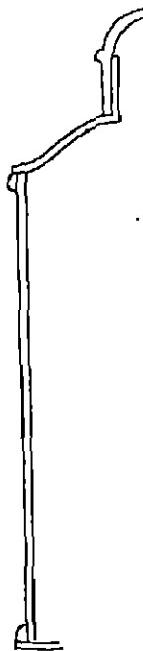


Fig. 7
Complete section

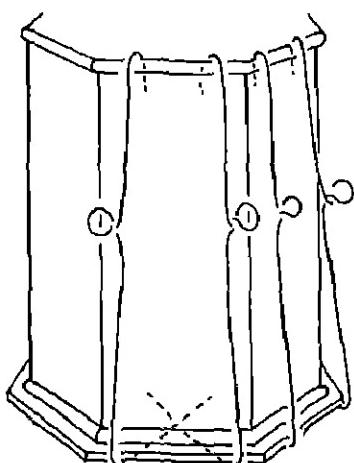


Fig. 5
Wiring base to the body

have the neck set abruptly on this would look most undignified. There should always be a gradual leading up of one part to another. We are not building a cold, lifeless concrete staircase, but putting together a series of widely varying forms which nevertheless harmonise with, and are related to, each other thus constituting a complete and satisfactory whole. A domed or raised shape is therefore needed. This can be called the shoulder. A curved lid again would look better than a flat one. Note the alteration of straight and curved lines. Namely, straight sides, curved shoulder, straight neck, and curved lid. After drawing this elevation, draw a circle $3\frac{1}{4}$ in. in diameter and set out an octagon. Take the length of one side and measure it along a strip of 22 S.W.G. gilding metal or brass eight times. This gives us the width for the blank; the depth will be 5 in. Mallet flat and set out the eight sides. With the chisel used in the first few lessons and a hammer, cut a fairly deep incision along the lines drawn, Fig. 3. Anneal and bend up having previously nicked and mitred the two edges with a file as before, Fig. 4. Wire together and solder with the hard solder. The corners should be strengthened with solder also. Planish on a narrow flat stake care being taken not to stretch the corners. Use a flat hammer with well rounded corners.

Mount the top and bottom edges with a half-round wire, nicking them to produce sharp corners as in Section XIII. Cut out an octagonal piece of 18 S.W.G. brass sheet a little larger than the body. It should project beyond the half-round wire about $\frac{1}{2}$ in. Mallet flat and planish. This will be the base. Wire the body and base together with binding wire and easy solder, Fig. 5.

Shoulder.—Cut out a similar piece of brass for the shoulder. Dome and planish and flatten the edges. Roughly cut to an octagon. Draw a circle $1\frac{5}{8}$ in. in diameter from the centre and saw pierce, Fig. 6. Solder to the body.

Neck.—Cut out a strip of 22 S.W.G. brass sheet $1\frac{1}{2}$ in. by 1 in. and bend up into a ring. Hard solder the joint and planish true. Solder this to the shoulder of the body using easy solder. Make sure that the top edge of the neck is horizontal by testing with the scribing block on the surface plate.

Lid.—This is simply another ring of metal with a domed top which fits accurately and fairly tightly over the neck. Solder to this a half-round wire top and bottom. Dome the piece for the top of the lid and planish. File, emery cloth and polish as before. (See Fig. 7 for complete section.)

TEACHING HINTS

Flat hammering.—This will be the most difficult operation during this lesson. Let the class practise on a flat piece of metal. The hammer must have its edge well rounded and smooth otherwise the surface of the metal will be badly bruised.

Heating.—Avoid a fierce flame suddenly directed to one place—particularly on the body itself. This would undoubtedly cause distortion of the shape. Pass the flame gently and evenly over the whole piece of work gradually increasing its intensity.

XXII. FLOWER VASE

Every process practised in the preceding sections with the exception of saw piercing are embodied in the making of this flower vase. Beauty of design, simplicity of form, and nobleness of proportion are represented in this one piece of work. In the course of its execution it is hoped that the pupil will appreciate these qualities which, combined with sound technique, result in the realisation of the meaning of fine craftsmanship.

Making the body.—This is shaped or fashioned from a truncated cone by a development of its elevation as in making the beaker in Section XVI. The dimensions of

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the elevation are $5\frac{5}{8}$ in. long, $3\frac{1}{4}$ in. across the top, and $1\frac{3}{8}$ in. across the base. 22 S.W.G. gilding metal is used. Hard silver solder the seam and lightly—but not finally—planish the whole of it and anneal. On the head or stake (Pl. III, Fig. 6) raise to the shape required commencing on a line drawn 1 in. from the base, Fig. 2. Leave the top at its original width. Reverse its position and raise in the base on the raising stake, Pl. II, Fig. 1. The shape now should be like that in the full sized drawing of Fig. 1. Planish

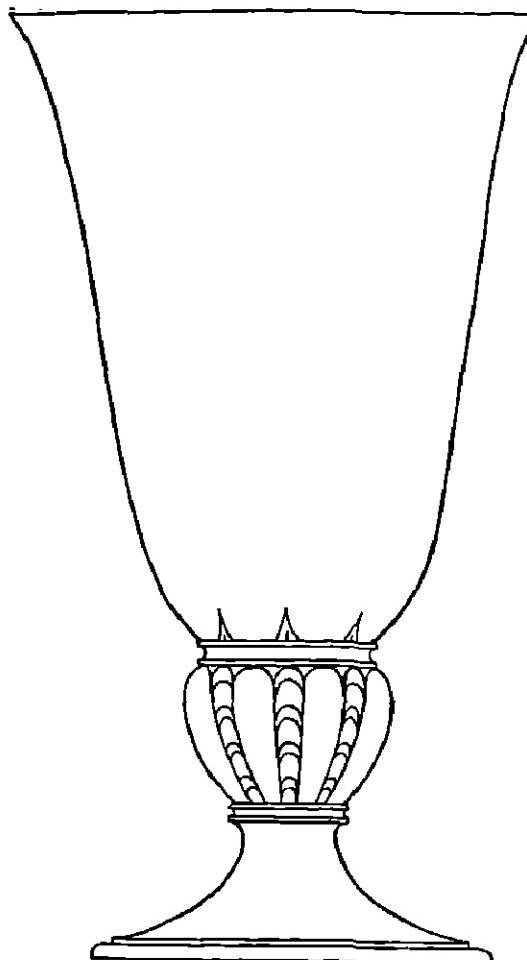


Fig. 1

FLOWER VASE

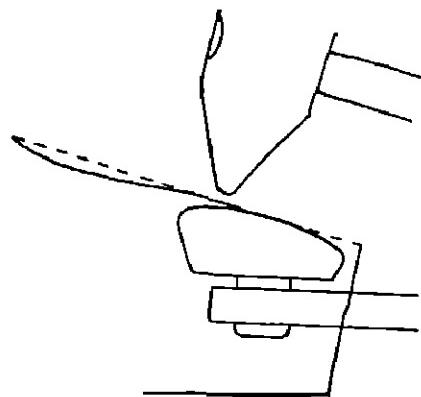


Fig. 2
Shaping the vessel

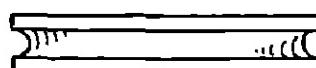


Fig. 3
Filing a hollow moulding
in the foot

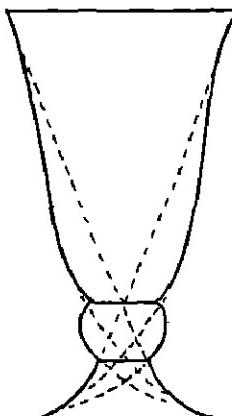


Fig. 4
One way of getting unity
and good proportion

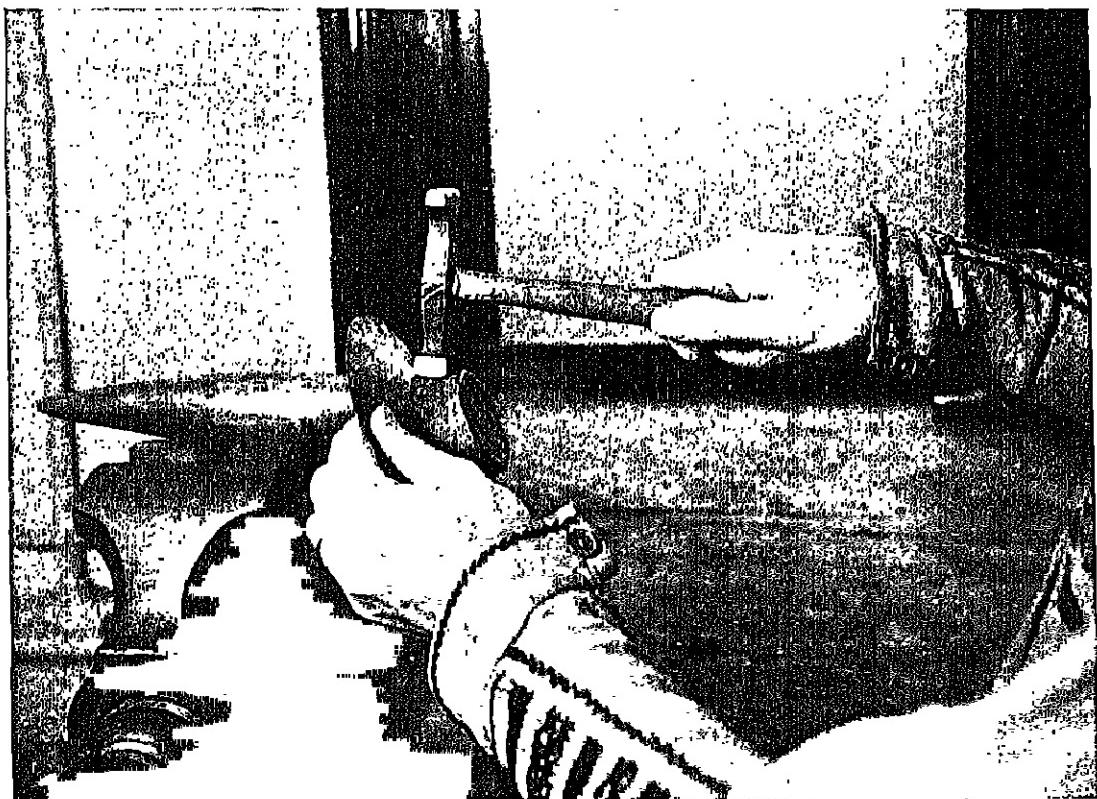
with the flat-faced hammer and change to the necking or collect hammer where the curve is convex at the top. Cut out a disc of 18 S.W.G. metal for the actual base and solder to the body.

Stem or knob.—This is also shaped from a truncated cone, its elevation being $1\frac{1}{4}$ in. across the top, $1\frac{1}{2}$ in. across the base, and 1 in. high. Raise to shape on a much smaller head or stake with the neck hammer. (A mallet will be found to be too large and clumsy for a thing of this size.) Planish as before. File top and base straight and horizontal with a large flat file. The decoration shown in Fig. 1 may be applied if desired by chasing after filling with pitch.

Mouldings or wires.—The top and bottom of the stem or knob must now be strengthened

with oblong wires which when filed hollow may be called mouldings. The one for the top will be $\frac{3}{16}$ in. by $\frac{1}{4}$ in. thick and the bottom $1\frac{1}{8}$ in. by $\frac{1}{16}$ in. thick. Bend these up into rings so that the diameter of the large one will be $1\frac{1}{2}$ in. (outside measurement) and the smaller one $\frac{5}{8}$ in. (outside measurement). Hard solder the joints and make perfectly round and flat. Hold them—one at a time, of course—on a round piece of wood and with a three-square needle file, file a groove round the outside. Now hollow the groove with a round needle file, Fig. 3. Easy solder them to the stem and file up neatly.

Foot.—This may be seamed or raised from a disc of thicker metal, say, 18 S.W.G. Raising is decidedly the easier method because of the great difference between the



PLANISHING A FOOT WITH CONCAVE SIDES

diameter of the top and bottom. Use the small mandrel, Pl. III, Fig. 9. Hard solder and planish as before. Bend up a stout oblong wire, say, $\frac{1}{4}$ in. by $\frac{1}{8}$ in., hard solder the joint and easy solder to the foot. Finally file smooth all joints and any surplus solder and polish.

TEACHING HINTS

This section may be beyond the capabilities of the average pupil, but could be made by a boy having outstanding ability and aptitude. In any case it would serve as a lesson in design and proportion which are important factors in decorative metalwork. Fig. 4 shows one method of determining unity of design between each part. It would be a good plan to illustrate this method on the blackboard.

CHALICE IN SILVER BY THE AUTHOR

The illustration of this chalice forms the frontispiece of this article.

Bowl.—This chalice is made of standard silver and is enriched with gold details and stones (turquoise-matrix). The bowl is raised and hammered from a blank—a flat disc of metal—and gilt inside. A Latin inscription, also gilt, surrounds the top of the bowl.

Calyx.—This is domed from a small disc of silver and has a chased decoration. It forms a pleasant cup for the bowl to rest in.

Stem.—The part connecting the bowl and foot is called the stem. This is made from an oblong strip of silver and is octagonal on plan. The corners inside are grooved with a chisel, bent up, and the seam hard silver

soldered. Small oblong wires are applied and filed to form delicate mouldings. The stem passes right through the knop and is therefore in one piece.

Knop.—The bulbous part between the bowl and foot is called the knop and is held by the hand when the chalice is used. It is circular on plan and is formed of two shallow domes soldered together. An octagonal hole is cut out of the top and bottom, thus allowing the stem to pass through it, and soldered to it. The channels are produced by using a blunt chasing tool whilst the knop is filled with chasers' pitch. This is emptied several times during the operation as the silver becomes very hard under the tool. The eight square facets round the centre of the knop are thus formed, and also the corresponding pointed shapes springing from the flat faces of the stem. To each square facet is soldered a gold setting which contains the stone. Other gold details are added as enrichments.

Foot.—This is also raised from a flat disc and made octagonal by shaping on a suitable stake with a hammer. It is then filled with pitch, the corners made sharp, and the pointed ovals at the base chased to form a lower level. The moulding to which the foot is soldered is built up of wires of various sections soldered together. Another moulding which joins the stem and foot together is made in the same way. Beneath it is a chased line decoration enriched with gold details. The three parts—bowl, stem and foot—are held together by a screwed thick round wire soldered to the bowl and extending to half the depth of the foot. An octagonal plate fits inside the foot, through the centre of which passes the rod. A nut finally holds all parts in position.



THE TEACHING OF WEAVING IN
THE SENIOR SCHOOL

THREE YEARS' SCHEME OF WEAVING FOR SENIORS

- I. INTRODUCTION. The educational value of weaving as a school craft. Methods of approach. Teaching suggestions.
- II. COLOUR. Some suggestions on the use of colour in weaving, based on the Ostwald theory.
SPINNING with a spindle.
DYEING with vegetable dyes.
DESIGN. The development of pattern. Stripes, plaids, twills and simple all-over patterns woven in with heddle or shuttle; warp patterns.
- III. TYPES OF LOOM (including home-made apparatus for school use). Cardboard looms of all types for raffia, 4-ply wool, coarse cotton, jute, etc. Board looms for simple weaving in coarse materials (*a*) without leashes, (*b*) with leashes and shed stick. Box loom with rigid heddle; rigid heddle or waist loom: method of construction for coarse wooden heddle suitable for 4-ply wool and other coarse materials. Rug weaving on picture frame looms; loom with rigid heddle. Tapestry weaving. Needle weaving.
- IV. MORE ADVANCED LOOMS. Roller looms; making and setting up a warp. Simple pattern weaving. Drafting patterns on squared paper. Box and table looms with two heddles; box looms with four heddles.
- V. MORE ADVANCED WEAVING. Table looms. Twills and their adaptations. Drafting patterns on squared paper. Weaving with 3-ply and 2-ply wool, mercerised cotton, flax and hand-spun weft. Weaving scarves, runners. Border patterns. Traditional threading drafts; e.g., rosepath, monk's belt, honeysuckle, etc.
- VI. FOOT POWER LOOMS. Method of fixing warp, attaching heddles, pedals, etc. New type of shuttle. Fabrics for curtains, cushions, bags, etc., in 2-ply wool, mercerised cotton, etc. Rug weaving on foot power loom; woven and pile rugs, string warp, wool weft. Spinning with a wheel.
- VII. TRIMMINGS, AND MAKING UP HAND-WOVEN MATERIAL. Cords, plaits and braids, etc. Tablet weaving. Suggestions on the use of hand-woven material. Woven buttons, buckles. Bibliography.

I. INTRODUCTION

HAND LOOM weaving, in conjunction with the other home crafts which suffered a decline with the introduction of machinery, has of recent years been gaining in popularity as a hobby, a means of livelihood and latterly as a means of education in the schools. Many old looms and spinning wheels, relegated to attics or cellars at the time of the introduction of machinery, have been brought to light, repaired and put into action once more.

In the earlier days almost every individual was familiar with the methods of producing clothing, as looms were part of the household equipment and the working of these was the family's concern. The simplicity of the equipment and the limitations of the tools in themselves prevented over elaboration. The work was simple and direct, and the decoration restrained. The weaving expressed the character and individuality of the creator and provided a beauty possible only when a piece of work has been conceived and executed by the same person from start to finish.

With the introduction of machinery the character of weaving was changed. It became more mechanically perfect and more elaborate in design due to the complexity of the machine. There was a similarity in the fabrics and they no longer expressed the individuality of the weaver, thus losing much of their charm. Artists in due course realised this change and lamented the decline of early craftsmanship. Ruskin and Morris were largely responsible for a revival of interest—an interest which is by no means fleeting. Weaving has been practised by members of clubs and institutes and in many schools for some years. Educationists realise the value of creative work which is encouraging and satisfying to the individual. Every individual has an innate desire to create and if this is given scope it results in a fine sense of achievement.

A weaver should whenever possible begin with the fleece but in any case should have experience in spinning, dyeing, warping and weaving. When she remembers what appeared to be a tangled mass of threads in the early stages of weaving, she cannot fail to be thrilled at the sight of the finished fabric, and to be full of admiration for the inventor of a method of warping which eliminates all possibility of a tangle. Woven fabric will henceforth have more meaning and there will be real respect for the earlier weavers. The historical interest will be ever present and a weaving course should as far as possible be taken from this point of view, though the method of approach will naturally vary with the type of school. Work should begin with the simplest materials and tools—in the same way that primitive people used the materials within their own environment. Children should experiment with materials and equipment and try to rediscover for themselves many of the labour-saving devices adopted by the early weavers. The educational value of the craft rather than "results" should be of paramount importance. Taken in this way weaving will have a historical background and children will have an added sympathy with the weavers of to-day, if not a complete understanding of the intricacies of the modern looms. The craft should improve general taste and lead children to an appreciation of colour, texture, design etc., through direct experience.

Weaving can be practised by children and people of all ages, and the simplest weaving done by the infants can be developed throughout the child's school life. If the interest has been a live one, weaving may be carried on in later years as a hobby in the home. The craft is an inexpensive one. Raw materials are not costly, much of the equipment can and should be made by the children themselves, and there is little

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waste. Moreover, the articles made find a ready sale, which is of importance from the school point of view.

Though children's work will not show the same standard of technique as that of the adult, some interesting and attractive pieces of work can be produced.

As the senior schools draw their scholars from different types of school it is futile to hope that all scholars will be ready for the same type of weaving. Some children will have done weaving in the infant and junior school, others will not. This means that work of the simplest type will have to be done by some children and more advanced work by others. Though some girls in the first year in the senior school may have to do work suitable for younger children, the experience will be of value and a better standard of technique and taste can be expected.

In view of this disparity of ability it is impossible to divide the work either into "terms" or "years," but this series of articles will cover all types of weaving which should be included and which should prove sufficient for a three-year course in a senior school. The girls should proceed from one type of work to another as time and circumstances permit, and should be allowed to concentrate, in their last year, on the branch of work in which they show particular interest and ability. (A full list of suggestions for suitable articles will be added at each stage.) In this way work on more or less individual lines can be carried out. The school equipment will again necessitate the work being run in this way as it is hardly likely that all girls can work at the same time on either table or foot power looms, as there may be only one or two of each type in the classroom.

Hints on teaching methods.—

1. All work should be done for a specific purpose.

2. Work should give scope for individuality, thought and experiment and not be merely a mechanical process. Though a

good standard of work should be aimed at, too much stress should not be laid on technique. The actual piece of weaving may not be all that is desired, but a teacher should realise the value of the experience gained in producing it.

3. Looms and equipment should, as far as possible, be made by the girls themselves. (Excellent results can be obtained from the simplest equipment.) A child who has helped to construct her own loom will have a far clearer understanding of its principles.

4. A few primitive looms should be made by the class. All children should make and have experience in the use of shed stick and leashes, but should not be kept working with these too long as the work is tedious and interest may flag in consequence.

5. Certain processes must be taught to groups as required. There should be practical demonstration and careful supervision. Children should not be expected to know all the details of making and setting up a warp after one effort, but should watch and help other children until they are quite familiar with each stage.

6. There must be definite training in the use of colour in relation to weaving. Colours are rarely pure as the passing of one colour over another affects the final result to a marked degree.

7. The historical and geographical associations of the craft should be dealt with fully. Children should have a knowledge of the work done in various parts of the world by primitive weavers; present-day weavers; the growth and preparation of materials; the evolution of the shuttle, the loom, etc.

8. Visits where possible should be paid to museums, mills, exhibitions. Children should examine good pieces of weaving showing the use of vegetable dyes, traditional designs, etc. Stress should be laid on the cultural value of the craft throughout the course.

9. A classbook of photographs of weavers, looms and anything relevant to the course should be kept by the children. In addition, they should keep an album for cuttings and

samples of weaving showing texture, patterns, etc., and details of materials used. This is particularly useful for reference and saves considerable time in the calculation of amounts.

Some interesting photographs of weavers, looms, etc., can be found (1) in the daily newspapers; (2) in the magazine issued by the Geographical Society; (3) in *Peoples of all Nations*; (4) from catalogues; (5) from The Victoria and Albert Museum, the following numbers being of particular interest:—No. 51873, a carpet loom; No. S.M. 289, a braid loom; No. 35967, a tapestry loom; No. 30887, a small model of an English loom, etc.; (6) from films taken by friends travelling abroad. All of these should find a place in the classbook on weaving.

Looms.—As children should have some experience in the construction and working principles of various types of primitive looms early in their weaving course, details of the looms illustrated on Plates I—VII

will now be given. These looms are small working models made as accurately as possible from the details given in Ling Roth's book on *Primitive Looms*, but they represent a small section only of the great variety dealt with in this book. Children will find it easier and more helpful to make their looms on a larger scale than those illustrated, so that they can be used for experiment and discovery. It will not be necessary for every child to make each type of loom but groups of children should be responsible for one particular type, and each primitive loom made should show an advance on the previous type so that the children can trace the history of the development of the loom and its labour-saving devices. The knowledge gained in this way will be of value to the children when they are constructing more advanced looms for their own use, at various stages in the course.

I. *The Solomon Island loom* (Plate I) represents the transition from plaiting to weaving. The absence of labour-saving devices and the short piece of fabric that

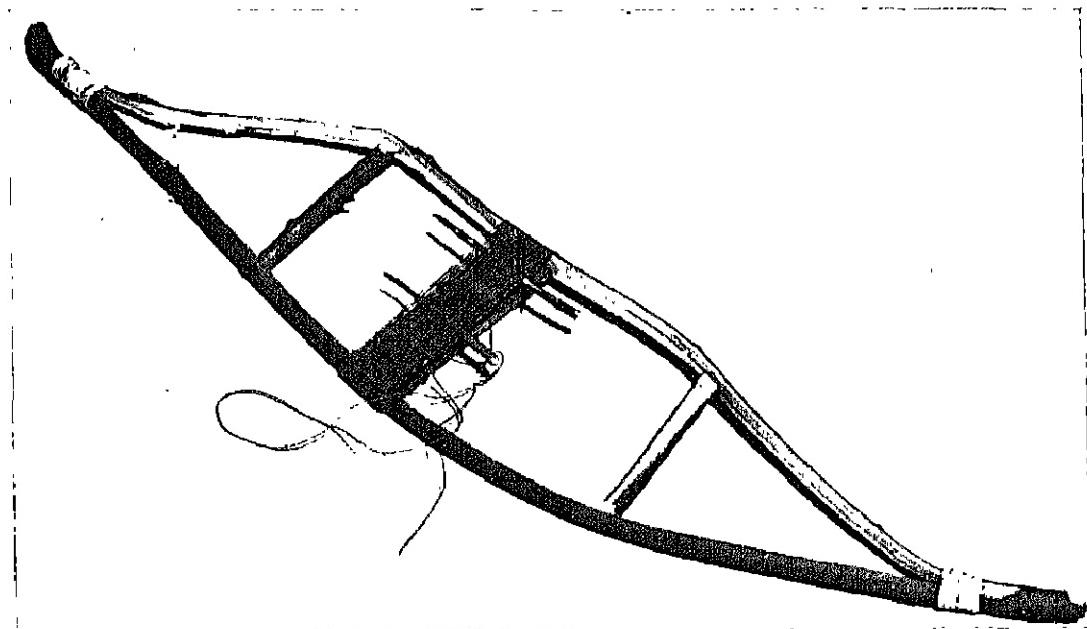


PLATE I. SOLOMON ISLAND LOOM

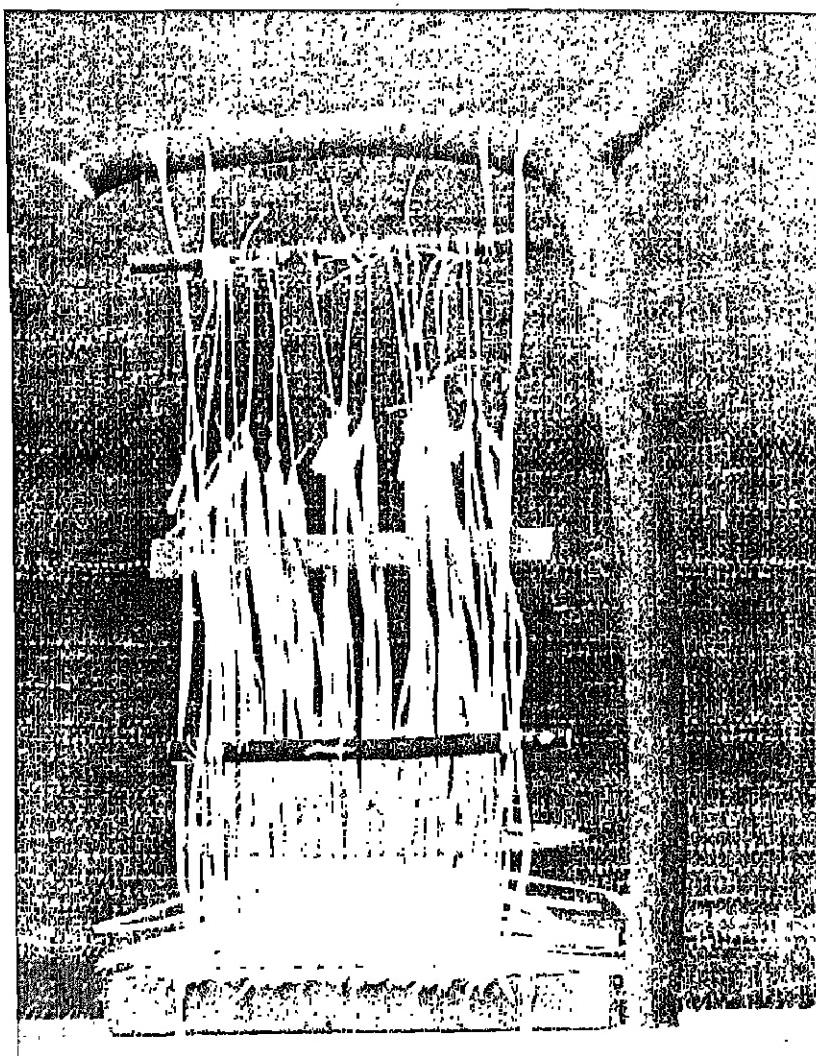


PLATE II. MODEL OF THE BA-PINDI LOOM

can be woven place this loom amongst the earliest examples. It consists of splitwood bound together with fibres at the ends, the two pieces of this the main structure being kept in place by two vertical rods. Raffia is wound round and round the loom to form a continuous warp. The same material is used for weft.

2. *The Ba-Pindi loom (African)* (Plate II) is a typical vertical mat loom using shed

stick and leashes. A warp of fibres from palm leaves is attached to the breast beam passing the strands between two thin rods, then over and under both rods and through the loop thus formed (similar to the half hitch knot suggested in a later chapter). These rods are then fastened to an extra beam. The warp strands are bunched together about 30 in. from the breast beam and connected to the warp beam with cords.

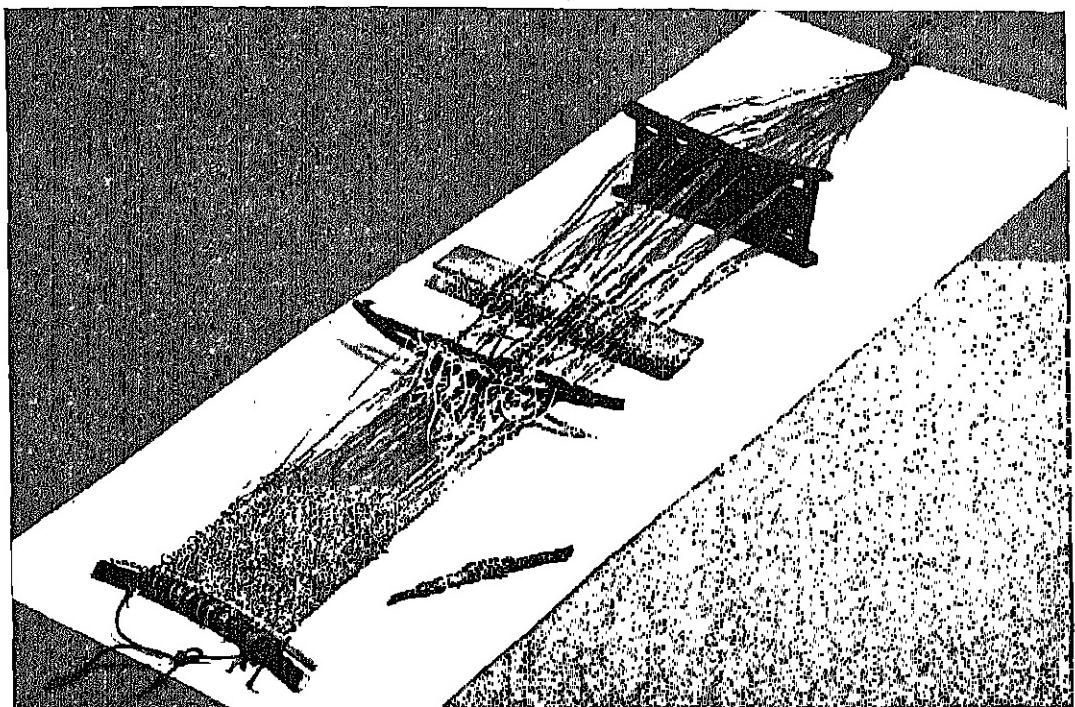


PLATE III. AINU WAIST LOOM

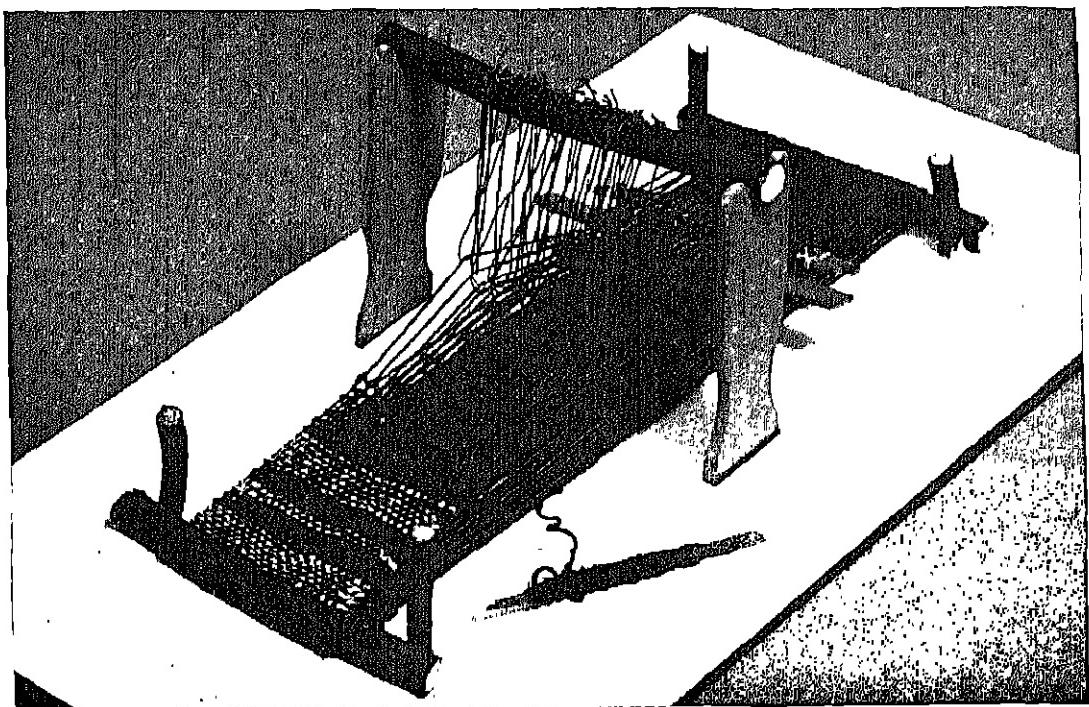


PLATE IV. MADAGASCAR MAT LOOM

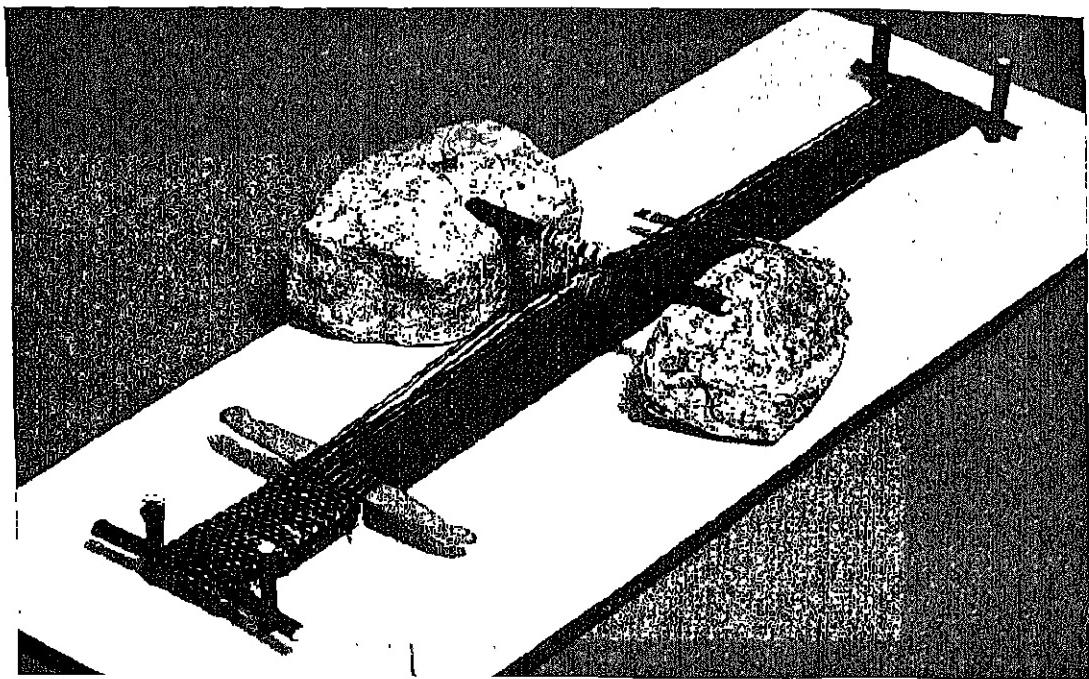


PLATE V. BEDOUIN LOOM

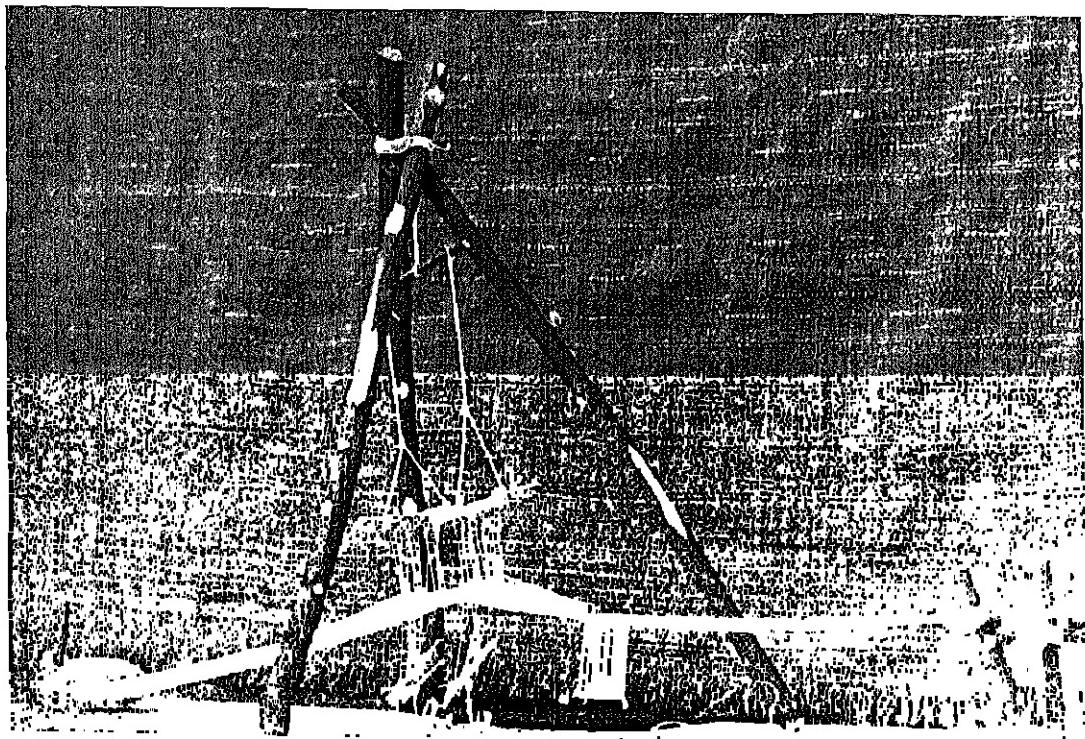


PLATE VI. MODEL OF PRIMITIVE LOOM—HORIZONTAL NARROW BAND TREADLE LOOM

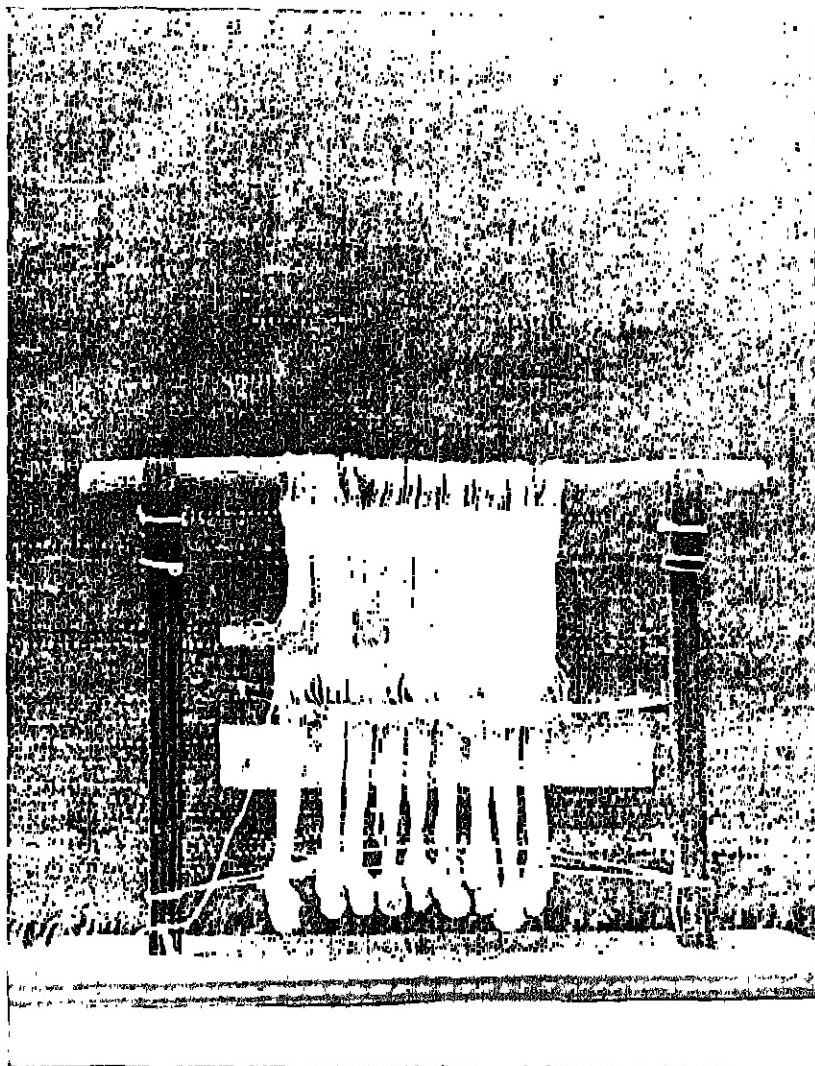


PLATE VII. MODEL OF WARP-WEIGHTED LOOM

The headle consists of two strips of cane on which eight sets of two knots are threaded. Each set is entirely separate from its neighbour.

Short lengths of west are woven across the warp.

3. *The Ainu Waist loom* (Plate III) is a primitive loom involving shed stick and leashes. It differs from the Ba-Pindi loom in that the warp is in this case fastened to

a peg in the ground at one end and to the weaver's waist at the other. This loom is used by a very primitive race in North Japan and appears with many variations. The model shown on Plate III has a warp spacer, beater and leashes.

4. *Madagascar Mat loom* (Plate IV) with fixed heddle; warp of raffia. The warp is in this case continuous and passes alternately (a) round the warp and breast beam;

(b) round the warp beam, through a leash, suspended from a rod and then round the breast beam. One shed is made by leashes suspended from a rod, the other by raising the shed stick. This loom is an advance on those mentioned previously as it indicates a different labour-saving device.

5. *Bedouin loom* (Plate V) from upper Egypt is also a fixed heddle loom, the heddle being supported on two stones. The weaver sits on the warp to keep it taut. As this is a nomad's loom it is easily transported from place to place. The warp and breast beams are kept in position by pegs driven into the ground. Children will find this a most interesting loom to make.

6. *Horizontal narrow band treadle or tripod loom* (Plate VI) is a more advanced loom involving reed, heddles, treadles, etc. The two heddles are suspended from the top of the tripod. The reed has a handle so that it can be used as a beater. A cord passes from the base of the heddle frames to a stick or pedal which is used for lowering one heddle to form a shed.

The warp is wound round a peg driven

into the ground and then placed in a basket at the side. As the fabric is woven it is wound on to the breast beam. The whole tripod can be moved forward or back which eliminates the necessity of "rolling on" the woven fabric or "unrolling" the warp too frequently. This type of loom corresponds to the foot power loom with two heddles similar to that shown on Plate XXIV.

If children make this primitive type of loom first they will readily understand the working principles of the more advanced foot power looms, to be used in their later work.

7. *Greek warp-weighted loom* (Plate VII). Bunches of threads weighted together, though in the illustration of Penelope at her loom the threads are weighted individually, which would tend to untwist them and thus rob them of their strength. In this type of loom the length of warp is fixed and also the height of the loom, as weaving begins from the top. This loom plays an important and interesting part in the history of weaving but is not of practical value, from the weaving point of view, in schools.

II. COLOUR AND DESIGN

Colour.—As colour and design play such an important part in any weaving scheme some notes on these will now be given.

Many teachers have natural taste and colour sense and are able to develop this feeling for colour in their pupils. All, however, are not so fortunate and find that this aspect of the craft presents difficulty.

Many teachers taking nature as their guide have worked out excellent colour schemes on these lines. The pupils in Dowson Road Girls' School, Norwich (some of whose work is illustrated at various stages in this article), draw all their colour schemes from natural specimens. They choose a bird, flower, butterfly, etc., and indicate in paint all the colours found in

each specimen. They then go a stage further and show the proportion of each colour, and from this plan a design using the same proportions of colour as found in the natural specimens. In doing this they discover that proportion in colour is of paramount importance.

Their colour schemes are delightful and the woven articles with stripes and patterns in well-proportioned colour are pleasing and attractive. Much can be done by way of experiment in this direction.

Some teachers may prefer something more definite. The Ostwald theory of colour which is now in daily use in many of our schools will meet this need. Ostwald gives eight standard colours as the starting point—as

opposed to the old idea of primary and secondary colours. These colours—yellow, orange, red, purple, blue, turquoise, sea green, leaf green—are arranged in a circle. Children can make their own circles either in special paints or papers sold for the purpose. Experiments with these colours give two types of harmony; (1) the harmony by using two adjacent colours in the circle;

complementary will be more pleasing than equal quantities of each colour. If these two colours are used—one for warp and the other for weft—the fabric will be somewhat harsh and speckled, whilst one colour used for warp and weft with a touch of the other for the pattern will be more pleasing.

After experiments with the eight-colour circle children are introduced to other

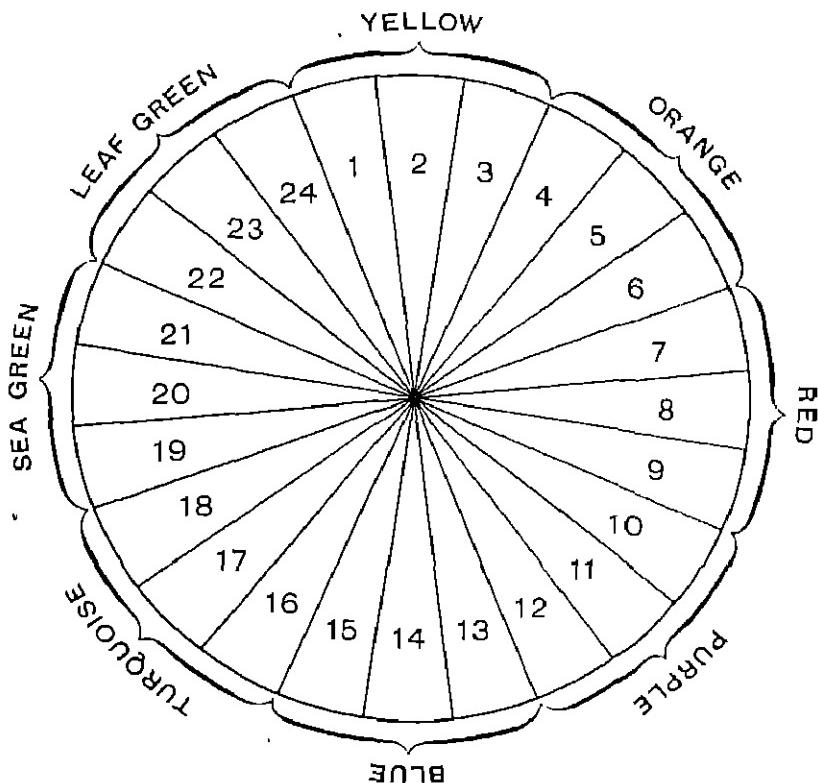


FIG. 1. N.A. COLOUR CIRCLE

(2) a contrasting harmony by using one colour with its complementary; i.e., its opposite in the colour circle.

Children should experiment with hanks of wool. They soon realise that the first type of harmony is the more pleasing and that the second type gives a much harsher effect unless used in the right proportion. They will see that one colour with a touch of its

circles giving still wider scope for colour schemes.

In the twenty-four-colour circle now introduced (Fig. 1) the children will discover that the middle one of each group is the standard colour or hue, and that the one on the left has a little of its neighbour on the left in its composition, the one on the right a little of its neighbour on the right. More pleasing

harmonies are now possible. Children should make the new colour circle, known as the N.A. range.

The eight standard colours are now Nos. 2, 5, 8, 11, 14, 17, 20, 23. Wools, linings, felt, raffia, etc., can now be ordered by giving this number and letter without sending patterns, which greatly simplifies things for the teacher. More subtle harmonies are now possible as the change from one colour to another is more gradual. Further experiments can be made in the use of contrasts. Instead of using the colour which is directly opposite in the colour circle we may use a colour on one side of this or even a little from both sides. Children can use two adjacent colours with a little of their complementaries.

Two more ranges are now possible. The N.E. range "shades" is made by adding a touch of black to each of the colours in the original twenty-four circle, and the I.A. range "tints" by adding a touch of white. The same types of harmony can still be produced but they will be more subdued and quiet. A new type of harmony—the one-colour harmony or dominant harmony—is now possible and is produced by using a standard colour with its tint or shade or both into which a touch of its complementary standard colour, its tint or shade, can be introduced.

These three sets of twenty-four-colour circles should suffice for most school purposes, but children should realise that other circles can be formed—the N.I. range by adding more black, and the E.A. range by adding more white to each of the previous colours. A further set can be made—the greyed colours, by adding black and white to each of the original twenty-four colours.

Children have endless scope for experiment and can arrange plaids and stripes on paper as a preliminary. It must be remembered, however, that the colours shown by the paper will not be exactly the same in the actual weaving owing to the intersection of the warp and weft threads. Children should, after some practice in weaving, set

up a warp in fine 2-ply wool (16 threads to 1 in.) on a card or board loom consisting of 2 in. of each of the standard colours plus black, white and grey, and weave across this with each colour in turn to depth of 2 in. The finished fabric will show the eight standard colours, also the twenty-four N.A. colours, and shades, tints and shaded tints of the original eight standard colours. The effect of adjacent colour is also apparent. Though in such a scheme as this colours become standardised, work by no means loses its individuality. Children should at all stages be encouraged to use the shades and tints. The value of neutrals must not be overlooked and children should be led to see the value of greys as backgrounds for most colours. The natural grey Shetland wools are particularly pleasing; Ostwald recommends the use of black with shades and white with tints but both look well with very bright colours. Grey, black and white can be used together. The use of these with bright colours is illustrated in James' book of *Indian Blankets*. "Off white" and "off black" are often more pleasing than pure black and white. Unbleached cotton and linen are pleasanter to use than dead white material. Natural sheep's wool, and black sheep, which is not quite black, make most pleasing backgrounds.

Spinning with a spindle.—As this scheme of weaving is traced historically, it will not be complete without spinning and dyeing, so these phases of the craft are dealt with early in the course in the hope that they will be carried on at various stages in a child's life in the senior school. Spinning will be dealt with first, so that much of the wool used in the weaving course can be spun and dyed by the children. Spindles and hand-spun threads have been found in ancient tombs, some of which are dated about 2000 B.C., and references to spinning and weaving are found at various parts of the Old Testament. Spindle whorls made of clay, stone, bone, metal, etc., are to be seen in many museums. A stick or spindle

passes through a hole in the centre of these whorls. The whorls help the spindle to revolve easily for twisting and spinning the fibres. This method of spinning was used until the invention of the wheel in the sixteenth century and is used in many parts of the world to-day; e.g., Italy, Greece, India, Morocco, etc. Many of the spindles used are beautifully carved and are fine pieces of craftsmanship.

After seeing illustrations and samples of spindles the children, following the same stages as their ancestors, will collect from their own environment things suitable for making spindles. Plate VIII shows a variety of spindles made by a class from such things as knitting pins, dowel rods, toy cart wheels, rubber heels, a flat wooden disc or patress used in electrical work, etc., all of which can be procured for a few coppers. The last

mentioned, No. 6, was particularly successful. Though many old spindles have a notch at the foot of the spindle, and many modern ones sold for the purpose have a notch at the top, it is found from experience that neither of these is necessary as the special half hitch knot used at the top of the spindle tightens on itself and prevents the wool from slipping off the spindle. Children can collect fleece from the hedgerows for some of their early experiments, but for the first exercises in spinning it is advisable to buy a long staple fleece; e.g., Lincolnshire, Leicestershire, Shropshire. The Southdown and Shetland wools are delightfully soft and pleasing but are much shorter staple. An odd fleece can often be purchased quite cheaply from a local farmer. Though some people prefer to wash the wool before spinning, it is much easier to spin in its natural

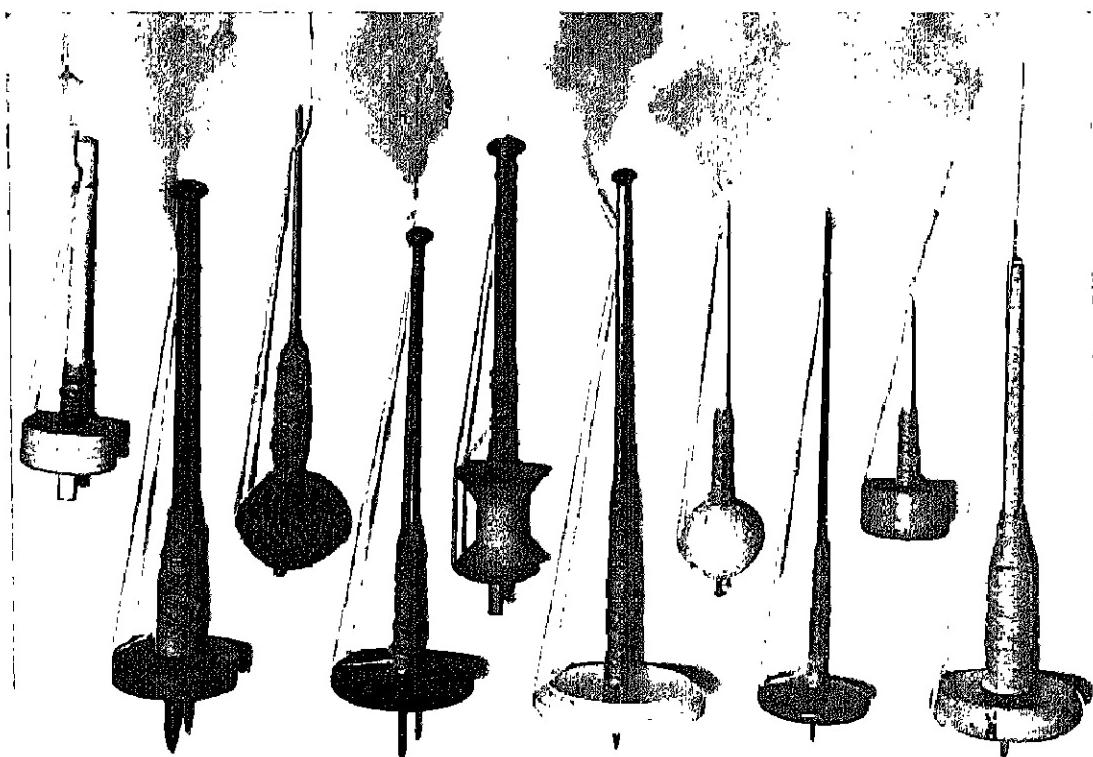


PLATE VIII. HOME-MADE SPINDLES

hurried. The wool to be dyed, particularly hand-spun wool, should be perfectly clean and the yarn should not be inserted in the mordant bath until the water is warm. The liquid should be brought slowly to the boil and kept simmering for about half an hour to one hour. In most cases the wool should be left to cool in the mordant and throughout the whole process the liquid should be covered over to protect it from the light, the covering being removed only occasionally while the liquid is stirred and the wool gently moved about.

There are several methods of mordanting:

1. Dissolve mordant in warm water, add wool and bring to boiling point, simmer for half an hour to one hour.
2. Dye wool; add mordant to dye bath and simmer for half an hour or more.
3. Boil mordant, dye and yarn all together.
4. Mordant wool; dye it, then mordant again.

The colour of dyed wool depends not only on the dye-stuff but on the mordant used with this.

Several utensils are necessary, preferably one for each colour, but if this is impracticable one must be kept specially for use with sulphate of iron as this tends to sadden colours. Galvanised buckets or baths are best for the purpose and wooden spoons or special wooden dye sticks are an absolute necessity. A few enamel saucepans are useful for dissolving the mordants, etc., and bowls are necessary for rinsing the wool if a sink is not available. A gas ring or oil stove is an absolute necessity, and rubber gloves should be provided.

The colours produced by vegetable dyes are soft and rich as seen in some of the old tapestries and rugs. They are fairly permanent and retain much of their original beauty even when faded. The children should keep very careful records of the dyes and mordants used. It is a good plan to keep a book for this purpose and insert in this a sample of dyed wool, together with the necessary recipe and all details likely to be helpful when dyeing this colour at a later

date; and to test the "fastness" of the wool by exposing a portion of it to strong light for a period.

Though many vegetable dyestuffs can be bought, it is more interesting for the children to experiment as far as possible with plants found in their own surroundings. Most of these need a mordant. Lichens, walnut, indigo, do not need a mordant, but if one is used the resulting colour is often improved. Children can classify plants giving the various colours, some of which are now indicated.

Brown.—Walnut—green husks; alder bark (alum mordant); lichen; crotal; hop stalks; larch; pine needles (collected in autumn); oak bark.

Purple.—Damsons (with alum); dandelion roots; elder berries (with alum).

Green.—Elder leaves (with alum); larch bark (with alum); lily of the valley leaves; nettle; privet berries and leaves (with alum).

Yellow.—Nettle (with alum); pear, plum, privet, poplar leaves; ling; marsh marigold; hop; heath (with alum); gorse bark, young shoots and flowers; onion skins.

Blue.—Elder berries; privet berries (with alum and salt); sloe (wild damson) fruit; wortleberry; woad; yellow iris.

Black.—Meadowsweet; oak bark and acorns; dock root; blackberry (with sulphate of iron); elder bark (with sulphate of iron).

Lichens, which can be found on rocks and trees, should be gathered in July and August and used (after drying) for dyeing wool, without a mordant. These lichens are used in Scotland and Ireland for dyeing various shades of browns. They should be used as follows. Put alternate layers of wool and lichen in a dyebath until the bath is full. Cover with water and bring to the boil. Continue boiling gently for one and a half to three hours until the desired colour is obtained. Grey lichen found on stone walls and on trees gives a pleasant fawnish-brown shade. Reds, yellows, fawns and browns are obtained from various lichens for tweeds. They should be gathered in late autumn. The gathering and naming

of plants, etc., could form an interesting part of the school nature study scheme. As it may be difficult for children to gather their dyestuffs in sufficient quantities, some will have to be purchased. Some of the most useful dyestuffs do not grow in this country and will have to be purchased. The most useful of these are:—

Cochineal (insects).—This gives scarlet if used with tin crystals and cream of tartar; crimson with alum and cream of tartar; claret with sulphate of copper and kermes; purple with sulphate of iron

Madder (ground-up roots of a plant).—This gives a delightful range of colours: red with alum and cream of tartar; reddish-brown with bichromate of potash; pink with alum and cream of tartar (the madder should in this case be put in very hot water which kills the brown colouring matter).

Indigo extract.—This gives all shades of blue ($\frac{1}{2}$ oz. to 1 lb. of unmordanted wool). It is also used for producing greens by dyeing wool yellow before redyeing in the indigo bath; or the wool can be dyed light blue, then mordanted, then yellowed with fustic, etc.

Fustic (powder or chips—ground up bark).—This gives a wide range of yellows. If the bark is used it should be put in a muslin bag.

Flavine (inner bark or a species of oak).—This gives a deep yellow.

Logwood (wood).—This is used for purples, blues.

Weld (wild mignonette).—This gives yellow.

As the study of vegetable dyeing covers such a vast field, it is impossible to deal with the subject fully in this scheme. Teachers are referred to useful books on the subject in the bibliography.

One or two recipes are given fully and experiments can be made on similar lines with other dyestuffs and mordants.

All wool should be thoroughly soaked and the moisture lightly squeezed out before entering the dye bath. Hand-spun wool must be carefully washed before dyeing to remove all trace of grease. First soak the

hanks, previously tied in four places to prevent tangles, in warm water for half an hour. Squeeze out and insert in a bath of well-lathered hot water (rain water if possible) made from soft soap or soap flakes. Skeins should be worked about in this but not rubbed. Repeat the process in other baths of lathered water until the wool is clean, then rinse in several bowls of warm water to remove all trace of soap. Always use sufficient water to cover the wool.

To mordant the wool.—Dissolve mordant in warm water, put in bath and let water warm before entering the wool. Bring slowly to the boil and boil gently for half an hour to one hour. Allow to cool (for every pound of wool use 4 oz. alum).

Squeeze moisture out of wool when it is ready for the dye bath.

Recipes.—

1. *Crimson from Cochineal*.—1 lb. wool; 4 oz. alum; 1 oz. cream of tartar; $1\frac{1}{2}$ oz. cochineal insects (if powder is used only half quantity will be required).

Boil insects fifteen minutes, fill up dye bath. Enter wool. Boil gently until the desired colour is obtained. There should be sufficient water to cover the wool.

2. *Madder red*.—1 lb. wool; 4 oz. alum; 1 oz. cream of tartar; 4 oz. madder.

When water is warm and mordant dissolved, enter wool and boil one hour. Take out of mordant and wash in warm water.

Dissolve madder in dye bath. When warm enter wool and bring slowly to boil. Boil half to one hour. On no account allow water to go off the boil. $\frac{1}{2}$ oz. tin crystals added to the bath will improve the colour.

3. *Onion skins* (yellow).—Mordant wool with alum.

Boil a quantity of skins for two hours (about same amount as wool to be dyed) and cool. Put in wool and boil for one hour. Allow to cool then wash and hang the skeins in the air to dry. If $\frac{1}{2}$ oz. tin crystals are used a bright orange colour will result.

After dyeing to any recipe, wool should be rinsed in several lots of hot water until

all trace of dye is removed. The wool should be lightly squeezed. It will tend to felt if either the water is too cool or if the wool is rubbed between the hands.

Design.—After having experience in weaving plain materials, the children, following the same steps as their predecessors, will long for some relief from the monotony of weaving "under one, over one" and so will think of ways in which the surface of the plain fabric can be broken up. This brings them to the early stages in pattern, which in the first instance consists of bands of colour introduced into the weft. Later, stripes of colour are added to the warp and weft. Children will realise the many possibilities of stripes and the great variety of patterns which can be achieved by stripes of varying widths and colours.

These can be planned out with paper or paint as suggested in the section dealing with colour, the stripes being fixed on a paper background of the same colour as the fabric to be woven. The children will discover plaids quite naturally and will see the various colours which result from weaving across a warp with various colours and with the same colour as the warp itself.

They will find pure colour where one colour in the weft crosses the same colour in the warp, and broken colour where one colour in the warp is crossed by another in the weft, and often in the case of two colours which blend together an entirely different colour will be produced; e.g., red crossing blue will give a purple. Blue crossing yellow will give a green, and red crossing yellow will give an orange.

The children should analyse some of the hand-woven raffia fabrics (*Ranbannes*) from Madagascar, amongst which some interesting plaids are to be found. Interesting results are obtained from a warp of two colours placed alternately or arranged in groups; e.g., warp 10 strands of blue and white alternately, then 10 white and blue across the warp. This can be woven with 10 rows blue, 10 white; 10 with alternate rows of

blue and white, which produces a most interesting fabric and suggests other patterns on similar lines.

Having exhausted the possibilities of stripes and plaids other types of pattern will be contemplated. Instead of weaving under one, over one, across the width of a warp, the children can go over and under groups of threads.

If the weft passes over three and under three for several rows and then the process is reversed, a check pattern will result. A basket weave is produced by passing over three and under one, reversing the process for alternate rows.

If the over three and under one process is continued (on a warp whose number of strands is divisible by 4) starting one thread to the right each time, a right-hand twill pattern is produced. While if the over three is started one thread to the left each time, a left-hand twill will result. Experience in weaving twills will lead to other variations, reverse twills, and to simple all-over patterns. The children should at this stage draft their simple patterns on squared paper, so that they gradually develop skill in this before they reach the stage of pattern weaving on the more advanced looms.

In all-over patterns the children should not work a pattern which involves weaving over more than five or six warp strands, as this gives a loose fabric and the long weft threads are likely to "catch" when the fabric is in use. Experiments in pattern weaving can be made on a card or board loom. Since many of the all-over patterns give rather a loose fabric, the children should now experiment with patterns using a row of tabby weaving after each pattern row. They should set up a warp in 3-ply wool, 14 threads to the inch, on the board loom and make a sampler of these darned-in patterns on similar lines to the one illustrated in Class Picture No. 127. This should consist of a number of borders on a plain background, the borders being separated by a line of colour. A binder in the same colour as the plain fabric is used between each



SAMPLES OF WEAVING I

1. SKIRT LENGTH.
2. OLD PERSIAN TAPESTRY.
3. SAMPLER IN 3-PLY WOOL.

4. SCARF.
5. WORKBAG.
6. SCARF.

7. BRAID.
8. WORKBAG.
9. SCARF.

(Class Picture No. 127 in the Portfolio.)

For the description of this Class Picture see page 418.

pattern row which necessitates the use of two needles or shuttles. The two colours must be interlocked at the edge and care taken to keep a good selvedge. For a heavy line of one colour, two or three rows of weft can pass under the same set of warp strands without using a binder. In order

to prevent these rows from slipping out (as they are under the same set of threads) the weft should be passed round the edge selvedge thread in each case. The weft for the plain fabric can be joined in the same way as suggested for raffia work, but in the case of pattern weaving with frequent



SAMPLES OF WEAVING 2

- | | | | |
|-------------|-----------------|-------------------|----------------|
| 1. SCARF. | 5.POCHETTE. | 9. BAG. | 13. SERVIETTE. |
| 2. HANDBAG. | 6. PLAID SCARF. | 10. SCARF. | 14. BELT. |
| 3. BAG. | 7. IRON HOLDER. | 11. TAPESTRY BAG. | |
| 4. SCARF. | 8. CURTAIN. | 12. HANDBAG. | |

(Class Picture No. 128 in the Portfolio.)

For the description of this Class Picture see page 419.

changes of colour this has to be modified and the new colour introduced at the end of the row. One row of weft is inserted leaving a few inches of wool at the selvedge. The end of this, after going round the end selvedge thread, passes under a few of the

same set of strands and is left on the surface of the work, being cut off later.

When the necessary rows in this colour have been woven the wool can be fastened off in a similar way and a new colour introduced. If, however, the two colours are to

be frequently interchanged, they need not be cut off but can be carried up the selvedge of the work and covered over with the various rows of weft. The two colours in this case must be interlocked carefully at each selvedge.

In a pattern involving numerous narrow stripes in the weft, another method of joining is possible. Leave the end of one colour at one edge of the fabric and introduce a new colour by taking it under the same set of threads but with the spare end of wool at the opposite selvedge. When the weft is beaten up the two rows of weaving under the same set of warp strands are quite inconspicuous.

Another type of pattern weaving is the inlay or brocade weaving. This consists of a pattern which is woven at various parts of a piece of fabric without taking the strands across the entire width of the warp. These patterns are still darned in with needle or shuttle and can be planned previously on squared paper. Each pattern row is followed by a row of tabby weaving or a "binder" in the same colour as the ground-work of the fabric, across the full width of the material. The pattern thread is brought up from the underside of the warp at the point where the pattern begins. This thread then passes over and under the various groups of warp strands and is then taken down to the underside of the work. A row of plain weaving follows and then the thread for the pattern is again brought between the warp strands to the surface of the work where a pattern row is woven. Class Picture No. 128 shows a bag with inlay pattern as its decoration. Some attractive patterns of this type can be woven on the more advanced roller looms at a later stage.

The subject of pattern must not be left with mentioning warp patterns. Up to this stage most of the patterns have been produced by the weft threads and the children

will have plenty of experience with this type of darned-in pattern as indicated, and at a later stage with the use of more elaborate devices, heddles, leashes, etc., for making pattern.

They can now be introduced to warp patterns. *Up to this stage they have used* a warp with 12 to 14 threads to the inch and will realise that if the threads are placed more closely together up to 30 threads to the inch, it will be difficult to weave under one and over one. Children can fix up a small warp on a piece of cardboard in 3-ply wool. The holes through which the warp passes should be staggered so that all strands are not taken through the cardboard on the same line, which would cause the cardboard to split. A very small piece of weaving with a fine thread can be done on this foundation, and from this the children will see that the warp strands are pulled closely together and that the weft is only discernible at the edges.

Braids with interesting warp patterns are made in Germany for ties and are used by ski-ers for wrapping round their trousers at the top of their boots. Some surprising results are obtained with this type of weaving. If a warp is made of alternate blue and white threads 30 to 32 to the inch and woven in the usual way, the following points are discovered. The first weft thread or "shoot" picks up the alternate white strands and, since the weft is not obvious, a horizontal white stripe is formed. The next weft thread picks up the blue and gives a blue horizontal stripe. If vertical stripes in the warp are required, several strands of each colour must be put together in the warp. An excellent loom for making braids with warp patterns is the Scottish inkle loom (Plate XIX) though this method should not be introduced to the children until they have had experience in rug weaving with leashes, etc.

III. TYPES OF LOOM

Cardboard looms.—These are undoubtedly the simplest and least expensive for some of the earlier examples of weaving, and some really attractive pieces of work can be done on this type of loom. For senior work the warp can be spaced more closely, giving a firmer texture to the finished fabric. The making of the looms provides a useful exercise in measuring and in cutting cardboard, so the senior children can make these for themselves.

The first piece of work should be done in raffia and should be a straight piece of weaving, done on a cardboard loom with serrated edges or a loom with pierced holes.

The former type of loom (Fig. 3) is more difficult to make but has the advantage

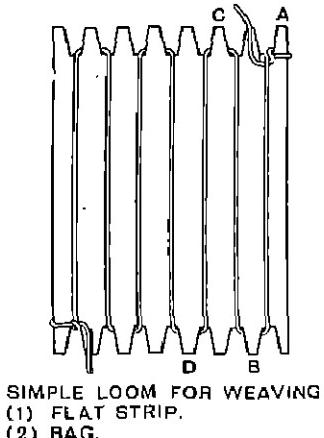


FIG. 3

that it can be used over and over again. The latter type on the other hand can be used for only one piece of weaving. All work should, of course, be done for a specific purpose and not be merely practice. The flat piece of weaving can be used for table mat, bag, book cover or carrier, needle case, etc., and can be woven in one colour only or with the introduction of stripes or plaids.

Method of making and threading loom with serrated edge.—The size of the loom must be decided first. This should be slightly larger than the size of the finished fabric. Any old cardboard boxes can be used for this purpose, provided that the cardboard is sufficiently strong to stand the strain of the warp threads. The loom should be cut as shown in Fig. 3 the notches being $\frac{1}{4}$ in. apart (for a finer piece of weaving $\frac{1}{8}$ to $\frac{3}{16}$ in. apart). The warp is tied round point

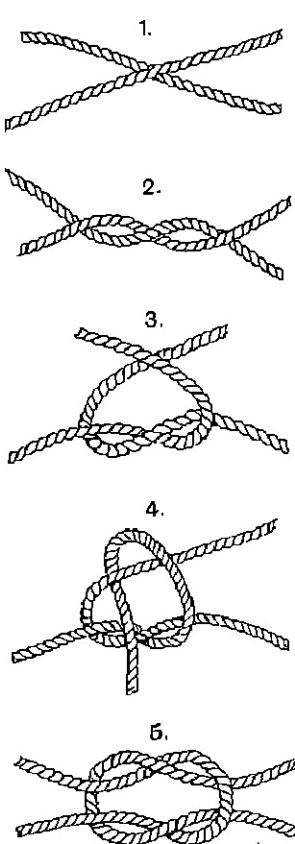


FIG. 4

A at the top right-hand corner, carried down and round point B, up to point C, and so on until the whole area is covered with warp strands. When the threading of the warp is complete the end of the warp strand should be tied round the point of loom. Joins in the warp should be made with either a reef (Fig. 4, 1-5) or with a weaver's knot (Fig. 4a) and the ends cut fairly short so that they can be covered up by the weft in weaving, but there should be no knots in the weft. When a new strand is

necessary in the weft the worker should weave as far as possible with the old strand, leaving the end at any point except at the edges of the work. Then with a new strand she should go back for a distance of four or five warp strands and weave under and over the same strands as before, and continue with the weaving. The two ends should be left until the work has been completed as the next row of weft when pressed up will hold the joins in place. The weaving can be done with a blunt needle. Care must be taken with the edges of the work. The loops made at the end for the return row

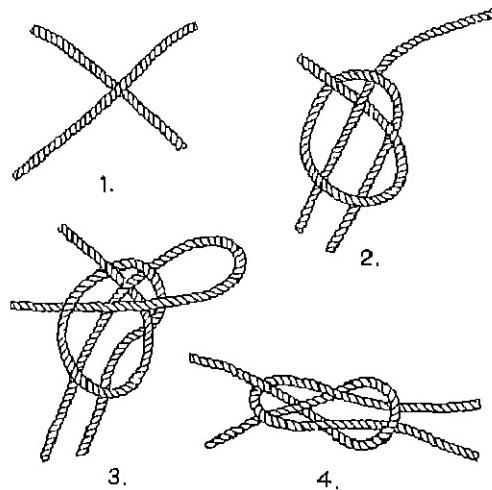


FIG. 4A. WEAVER'S KNOT

should be fairly loose and the weft lie perfectly flat to avoid a "waist" in the piece of fabric. It is a good plan at first to draw a line along both edges of the cardboard to indicate the correct position of the edge of the weaving, and children should endeavour to keep to this line.

Two different types of texture may be noticed in the weaving done by a class for the first time:—

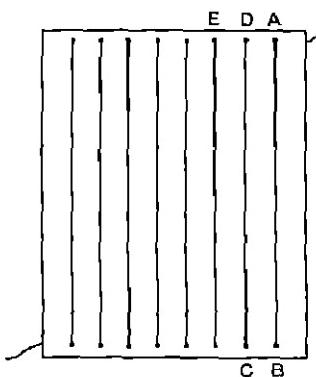
1. Equal quantities of warp and weft will show if the warp strands have not been placed too far apart (not less than six strands to the inch) and if the rows of weft have not been pressed together too closely. If one colour has been used for the warp

and another for the weft, equal quantities of each will show and a small check pattern will result. This is the most desirable texture at this stage.

2. In cases where the warp strands have been placed rather far apart, and the rows of weft have been pressed together too closely, the warp will be entirely covered by the weft and any colour introduced into the warp will be entirely lost. This texture will be necessary at a later stage; e.g., tapestry and rug weaving; so if the children discover this for themselves the knowledge will be of some value.

When the woven strip is completed the weaving is removed from the loom by slipping the loops over the points of the cardboard.

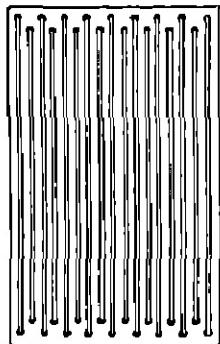
Looms with pierced holes.—These are much simpler to make and permit of a much more closely spaced warp than is possible with a loom with serrated edges. A line should be drawn about 1 in. from the top of the piece of cardboard, and another the same distance from the bottom, Fig. 5. The distance between these two lines will fix the size of the finished piece of weaving. Points should be marked along these two lines at distances of $\frac{1}{2}$ to $\frac{1}{4}$ in. These points should be pierced with a small piercer sold for the purpose, a stiletto or a compass point. In the case of the finer spacing, it is advisable to mark the points along two lines



CARDBOARD FOR WEAVING. WARP THREADED THROUGH HOLES.

FIG. 5

alternately, to avoid splitting the cardboard Fig. 6. To thread the loom, pass the strand through the top right-hand hole A and tie the end to the edge of the cardboard. Take the strand down to hole B, through this and



CARDBOARD LOOM SHOWING
METHOD OF THREADING FINER
WARP.

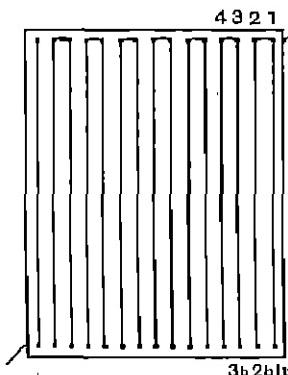
FIG. 6

back through hole C. Then pass the strand through hole D at the top and back through E and so on until the whole warp is threaded. When the weaving has been completed it can be removed from the loom by tearing away the strips of cardboard along the lines of holes. The work will then come away easily. The remaining piece of cardboard can if desired be used for another loom which will, of course, be somewhat smaller than the original one.

Careful attention should be paid to the method of joining up the strips of weaving. These should be sewn together with the same material with which the strips have been woven; e.g., raffia for the first exercise; wool, etc., later and there should be no attempt to cover up the stitches as they can often fulfil the double purpose of construction and decoration. Linings should be of coarse material; e.g., linen, crash, Madagascar raffia fabric (silks, sateens, etc., are most unsuitable combinations with raffia work). Handles should be made of plaits, cords, or flat woven strips. The latter are also useful for holding down flaps

of pochettes, etc., and can be made on a long strip of cardboard and with the warp strands placed close together. Zip fasteners and press-studs are not recommended as they are incongruous with the primitive appearance of raffia weaving and other hand-woven fabrics. Wooden or raffia plaited buttons and loops are much more pleasing to the eye (see Plate XXVII). Directions for making plaits and cords are given in a later chapter.

Serrated and pierced looms can be used for making bags in one piece, thus dispensing with a join at the sides. In warping these it must be remembered that the top of the bag must be left open, the bottom closed. In Fig. 7 the warp is tied to 1 and taken down the front of the loom, through 1b up the back of the loom, through 1 to the front, across the loom to the left and through hole 2. The thread is then carried down the back of the loom, through hole 2b, up the front of the loom and through hole 2 to the back of the loom and then through hole 3 to the front, down and through 3b, up the back of the loom, through hole 3, across to the left and through hole 4, and so on until



LOOM SHOWING METHOD
OF THREADING FOR BAG.

FIG. 7

the whole warp is threaded. As it is essential to have an odd number of strands in order to have the weaving correct, an extra warp strand must be added to one side only. This can be done by letting two warp strands pass

through the last hole or by piercing an extra hole near the edge of the loom. The end of the warp strand can either be tied to the edge of the loom or can be used without cutting for the first few rows of weft. The weft is taken continuously round and round the loom instead of backwards and forwards across one side as previously. If preferred, the bag can be warped from side to side—the warp strands being horizontal. The weaving then passes from top to bottom of the loom and up the other side to the top of the bag and so on. If the bag is woven in this way, care must be taken with the top edge. If the weft thread is pulled too tightly, the edge of the bag will not be straight.

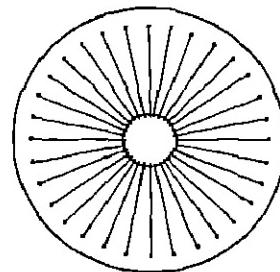
The children will find a guiding line drawn on the cardboard to show the true edge of the bag of great assistance in the early stages. The bag can be removed from the loom by tearing away the cardboard along the line of holes as before, or in the case of serrated looms by slipping the loops off the points of the cardboard.

Circular looms.—Though these looms do not follow in the natural historical sequence, they are dealt with here under the heading of cardboard looms. Weaving on these looms forms a useful exercise for children in the early stages of their weaving course and helps to give experience in the use of raffia and other coarse materials.

Circular mats are useful in the home for tables and other polished surfaces. They can be made in two ways: (1) by weaving on both sides of a piece of cardboard, thus totally enclosing the cardboard which makes a really strong mat; (2) by weaving on one side of the cardboard only, the mat being removed from the loom on completion.

For the first type of mat cut a circular piece of cardboard slightly larger than the size of mat required, and then cut a hole 1 in. in diameter in the centre, Fig. 8. Draw a circle about $\frac{1}{2}$ in. from the edge and mark points on this circle at distances of $\frac{1}{2}$ in. apart. As an odd number of warp

strands is required a slight adjustment of the distance between the last three or four points will be necessary. The holes should be pierced and a strand of raffia threaded through one hole and tied to the edge of the loom. Take this strand through the hole in the centre of the loom, up the back of the loom and through the next hole on the circumference. Pass it down the back of the loom, through the centre hole and up the front to the next hole. Continue in this way until the warping is complete. The end of the raffia is tied to the edge of the board. Start weaving as near the centre as possible,



CIRCULAR WEAVING ON BOTH SIDES OF CARDBOARD.

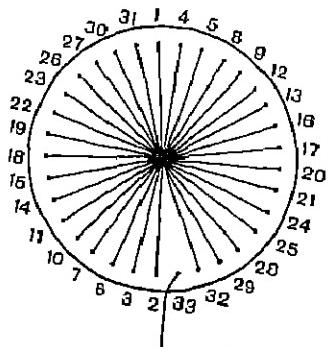
FIG. 8

leaving the end to be darned into the fabric when the weaving is complete. Pull the weft tightly and press down to the centre with the needle. Continue weaving until one side is covered, then do the other side in the same way. Bands of colour can be introduced into the weft and it will be noticed that as the weaving proceeds the warp, though exposed towards the centre, is entirely covered as the outer edge is reached.

When the weaving is finished the ends of the warp are untied and darned into the fabric and the surplus cardboard is cut away. A plait or cord can be used as a finish to the edge of the mat.

The second type of mat is more complicated as the warp is stretched from one point of the circumference to one diametrically opposite. In order to mark the points accurately, the children can make a paper

template the same size as the circle to be woven. This is folded into eight and the position of the folds marked on the cardboard. Each division is now divided into four equal parts with the exception of the top right-hand section which is divided into five. No. 1 should be at the top as in Fig. 9. The warp should pass from hole 1 to 33 in



CIRCULAR MAT WOVEN ON ONE SIDE OF CARDBOARD ONLY.

FIG. 9

sequence as indicated on the diagram, and it will be found that the strand which comes out of hole 33 must go to the centre. This is passed round the warp threads at the centre and weaving is begun with this strand. As this mat has to be removed from the loom on completion, care must be taken not to pull the weft too tightly or the weaving will not lie flat.

The circular pieces of weaving can be used for work bags if joined by an extra woven strip which can be continuous if desired and form the handle. Two pieces, if stiffened with thin card and lined, can be used for a case for holding d'oyleys. This can be fastened with a flap or a button and loop. Garden cushions, tam o' shanters and other ideas will suggest themselves to the teacher.

Circular weaving can be developed by continuing with egg and tea cosies, shell-shaped bags, etc. The looms can be made quite easily by senior children. Two bone or brass rings are necessary for each article and these are fastened one on each side of

the loom by a few stitches in raffia or string through the upper part of the rings. The shape required should be drawn on paper and this used as a template on the cardboard; the holes are pierced $\frac{1}{8}$ in. apart along this line. The warp is tied through the ring on the front of the loom, passed through the first hole on the right, across the back of the loom, through the ring and back through the next hole on the right. It is then carried across the front of the loom and through the ring, back to the next hole, and so on until complete. In order to prevent the first few strands from pulling the rings out of their true position, it is advisable to thread a few strands on the right of the loom, then a few on the left. The warp must not be stretched too tightly if the weaving is to lie flat. Weaving is started as for circular mats near the centre, though it will be found easier to pick up the strands near the outer edge and gradually press the weft close to the ring, with the blunt point of the needle. Stripes of colour can be added to the warp or weft or both. When both sides of the weaving are finished the cardboard is removed by tearing it away at the edge. The ring can be covered with blanket stitching in raffia and a handle made of a cord or plait.

Slippers can be produced by combining straight and circular weaving. To plan these,

children can draw round the shape of their feet on a piece of paper. The sole of the slipper can be made in felt or in plaited raffia or if preferred a bought sole can be procured. Using the sole as a guide, the shape of the uppers can be drawn, Fig. 10. The outer edge

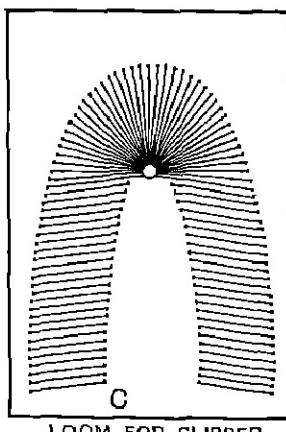
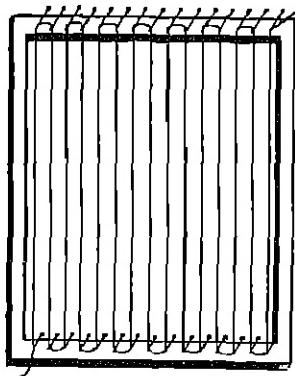


FIG. 10. C. STARTING POINT FOR WEAVING

of the pattern is slightly larger than the outer edge of the sole to allow for fulness at the toe. The depth of slipper is decided by the position of the ankle and is usually not more than $2\frac{1}{2}$ in. The back of the slipper should be slightly sloped so that it fits snugly at the heel.

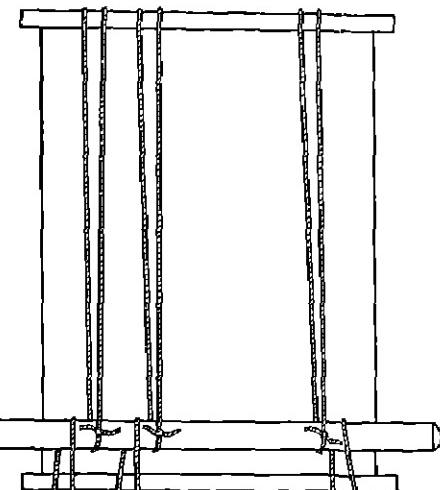
Mark and pierce points on the outer and inside edge of the slipper upper at a distance of $\frac{1}{4}$ in. apart. For the straight part of the slipper the warp strands should go through and back but for the curved portion the strands pass through the ring, across and through a hole at edge of loom; back through the next hole to the front and so on. Start weaving at point C on the inner edge of slipper, continue round the ring and along the other inner edge, and back to point C and so on, until the whole surface is covered. A few extra rows of weaving may be necessary at the toe. When complete, remove from the loom by tearing away the cardboard along the row of holes. Add a warm lining, using the woven fabric as a pattern for size; stitch up the back of the slipper and sew the upper to the sole. Finish off the top of the slipper with a neat flat plait.

Wooden looms.—Simple wooden frames as illustrated in Fig. II can now be used for weaving. These permit of a more closely spaced warp. Old slate or picture frames can



WOODEN FRAME THREADED
READY FOR WEAVING.

FIG. II



METHOD OF TYING SINGLE WARP STRANDS TO ROLLER.

FIG. 12

be used for the purpose. Nails are driven into the top and bottom beam of the frame at equal distances apart. Allow 6 to 8 warp threads to the inch for raffia; 10 to 12 for 4-ply wool, jute, coarse cotton; 14 to the inch for 3-ply wool. To prevent splitting the wood, the nails can be driven in alternately along two lines.

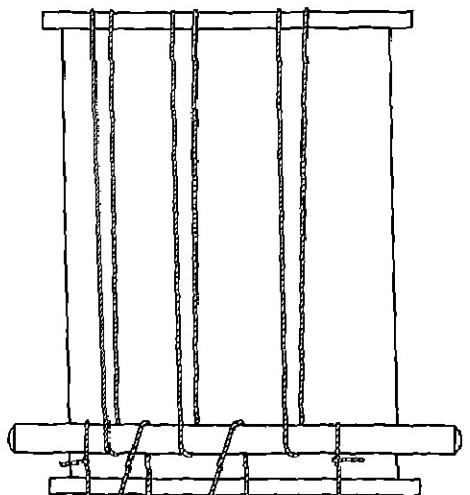
If children find difficulty in keeping the warp strands spaced equally, they can use either a cardboard gauge with serrated edge or a strip of wood with nails spaced the same distance apart as on the top and lower beam of the weaving frame. This spacer is put under the warp in such a way that each warp strand passes between either (1) two notches on cardboard gauge, or (2) two nails on the wooden gauge. This gauge can be moved farther along the warp as the weaving proceeds.

A flat board loom is next made by the children as follows. Take a flat piece of board of any convenient size; e.g., $13\frac{1}{2}$ in. by $5\frac{1}{2}$ in. On to each end nail a strip of wood about $1\frac{1}{2}$ in. wide and allow the ends to project $\frac{1}{2}$ in. beyond the edge of the board, Fig. 12. All surfaces must be well sandpapered to prevent the wool from catching.

364 TEACHING IN PRACTICE FOR SENIORS

The necessity for smooth surfaces in any type of loom must be emphasised from the start. 3- or 4-ply wool is used. To facilitate the moving of the warp round the board as the weaving is done, a round dowel rod is provided. At first the children will find it easier to tie each strand singly. Later they can make a continuous warp. Cut a number of strands double the length required to go right round the board, and allow a few extra inches for tying the knot. Fold the strand in half and slip the loop over the dowel rod which should be at the end (nearest worker) on the upper side of board for threading. The double strand is brought towards the worker and carried right under the board and across upper side of board to the rod where a knot is tied.

Repeat until the whole warp is threaded. To ensure getting an even tension, it is better to tie a few strands at each end of the rod first. Space the strands evenly before beginning to weave and turn the board over so that the rod is now on the underside. Begin weaving at the end near the rod. To make a continuous warp and thus do away with the tying of knots, the work should proceed as follows:—



METHOD OF FIXING A CONTINUOUS WARP.

FIG. 12A

Place rod on upper side of board near to the worker. Attach a strand to this and carry it under the board and across the upper side of board to the rod; pass round the rod and back along upper surface of board, underneath board to rod, pass round rod and carry thread back underneath board, etc., until warp is complete. It will be noted that the thread passing round the rod comes alternately from each end of board (see Fig. 12a). The board should be turned over, the rod now being on the underside. Weaving should begin as before. When a piece has been completed the warp is gradually moved round the board by gripping the rod at each end and pushing it further along the board.

Experiments.—Experiments in weaving simple patterns and borders, as suggested in Section II, can now be made. After weaving on this type of loom the children will arrive at the same stage as some of the early weavers and set out to invent some labour-saving device which will speed up the work. They will consider methods of picking up alternate threads instead of going "under one, over one" laboriously for row after row.

Previous to this stage the early weavers had made use of a device which is used at the present time in all types of looms—two shed sticks. These are necessary for spacing the warp strands, particularly in a wide warp of fine threads. Alternate strands; e.g., odd numbers; are picked up on one stick and the even numbers on another. A string is passed from end to end of each stick and tied to prevent it from slipping out of the warp.

The children will discover that if the stick nearest to the weaver is turned on its edge, it will raise one set of alternate strands, thus producing what is now known as a shed or opening in the warp through which a strand of weft can be passed. This, then, is the first labour-saving device which at any rate means a saving of time and labour on alternate rows. The shed stick can also

be used as a beater to press the rows of weaving more closely together. After using one stick in this way children and even adults often suggest that the second stick can be used in the same way, but experiment soon proves this impracticable as the first shed stick holds down the threads which should be raised by the second stick. The children, still working along similar lines to their predecessors, may discover the possibility of picking up groups of threads on the finger and passing the weft thread under this group of threads.

Leashes and shed stick.—This leads to the invention of leashes and leash rods which are really the first stages towards a heddle. Shed sticks and leashes are found on many primitive looms and are still used for weaving many of the beautiful Persian rugs. The writer saw such equipment used for a large Persian carpet which was being made at the Brussels Exhibition, 1936. Only about one quarter of the carpet had been completed after four years' work. Some workers use two sets of leashes for plain weaving, but it is obvious that the shed stick and one set of leashes does the work and is really a quicker method. Extra sets of leashes can be introduced for pattern work later, but the children are not ready for these at this stage. Leashes are loops of fibre or string and they are tied to the alternate warp strands which are not picked up by the shed stick. The loops are fastened on to a rod which when raised picks up the threads and forms a second shed. The leashes are tied in front of the shed stick.

The children will by this time have discovered the need for an appliance instead of the needle. From experience they discover that if too long a piece of weft is used with a needle it becomes unmanageable, and the children will now try to devise some means by which a longer piece of weft can be used—thus comes the invention of the shuttle. This can be in cardboard at first and later can consist of a flat strip of wood with a groove at each end. Ling Roth's book on *Primitive Looms* gives a very interesting

account of the evolution of the shuttle and the loom.

The leashes must all be the same length, and to ensure this a flat piece of wood or a ruler is laid on the warp and each piece of cord (of which a number should be cut of even length) is taken under alternate warp strands and then round the ruler and tied securely. When all the leashes have been fixed they are slipped on to a rod, which when raised picks up alternate threads. A cord should be passed from one end of the rod to the other and tied to prevent slipping. A continuous set of leashes can be made but children will find the tying of separate leashes much simpler.

If preferred the leashes can be made into loops first by tying round two nails knocked into a piece of wood. One end of a loop is then taken under a warp strand and the other end of the loop slipped through the first end, this loop then being slipped on to a rod. After their earlier efforts the children will find the actual weaving quite simple. They will discover that the shed made with the leashes is not so easy to manipulate so they can use a ruler or flat stick to slip into this shed and thus leave their hands free for working the shuttle. This ruler can also be used as a beater to press up the weft. Children can make such articles as pochettes, purses, ties, girdles, needle cases, trimmings, iron holders, bags, etc., and can join the strips decoratively to make larger articles.

Rigid heddle.—This now leads to another labour-saving device—the rigid heddle. The date of its introduction seems very uncertain but it has been used by primitive people for many years. Some interesting heddles made of bone or wood and sometimes beautifully carved, dated 1782 and earlier, are found among some of the museum collections. The heddles were made either from a solid piece of wood or from a series of strips.

The children will find it much easier to work with a heddle of this type. The warp strands are threaded alternately through a hole in one of the strips and through the space between two strips. The heddle is

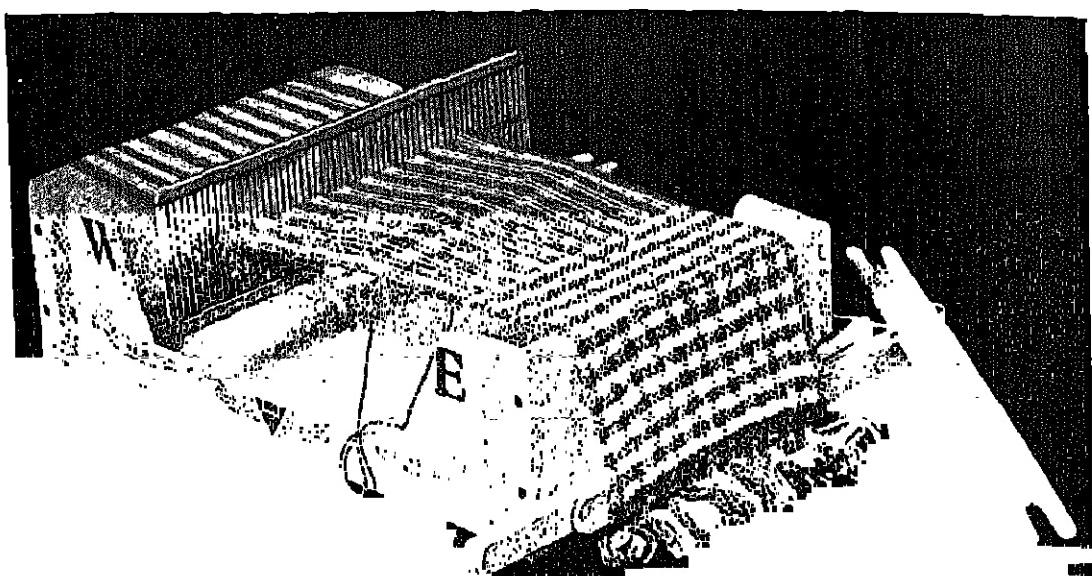


PLATE IX. HOME-MADE BOX LOOM

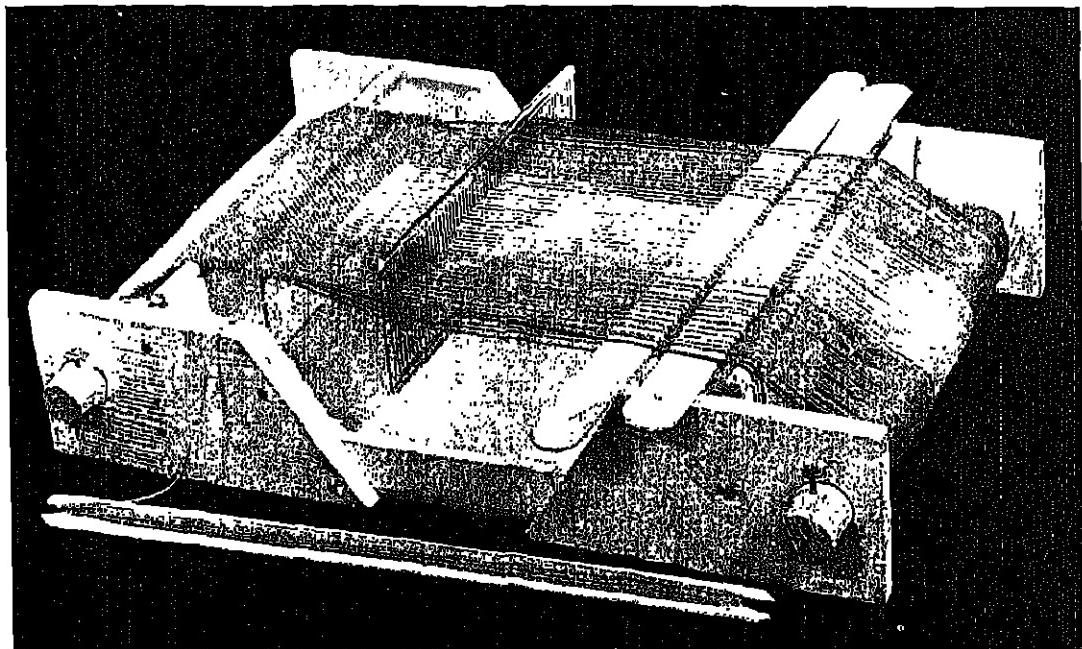


PLATE X. HOME-MADE ROLLER LOOM

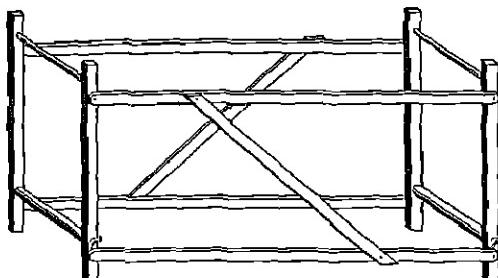


FIG. 13. FRAME LOOM

either raised or lowered, which results in the formation of two sheds.

Box loom with rigid heddle.—A new type of loom must now be used—a frame loom (Fig. 13) or one which can be constructed by the children themselves from an existing box. The sides of the box should be slightly cut away to facilitate the passing of the shuttle to and fro. This heddle, being rigid, can now act also as a beater. Plates IX to XI show one or two examples of roughly constructed box looms. Plate XI is the least satisfactory type as, being an early effort in loom construction, the maker omitted cutting away part of the sides of the box which prevents the shuttle from slipping into the shed easily. This loom is rested on the knee and has one wooden support which is kept in position by a wooden peg. The warp threads can at first be tied right round the box or can be fastened round the box and on to a round rod to facilitate the moving of the warp around the box, as suggested for the board loom.

The length of the fabric that can be woven from this warp will be rather less than the length of warp required to go right round the box. On using this type of loom the children will discover that with the constant working of the heddle the warp thread will stretch and become loose. This prevents them from getting a good shed. This difficulty can be lessened if round rods or thick flat sticks are passed between one end of the box and the warp threads as illustrated on Plate IX. The question of fixing a longer warp will come later. Plate XII shows a useful rigid heddle loom for tabby weaving. This has slots in the two side supports of the loom in which the projecting arms of the heddle

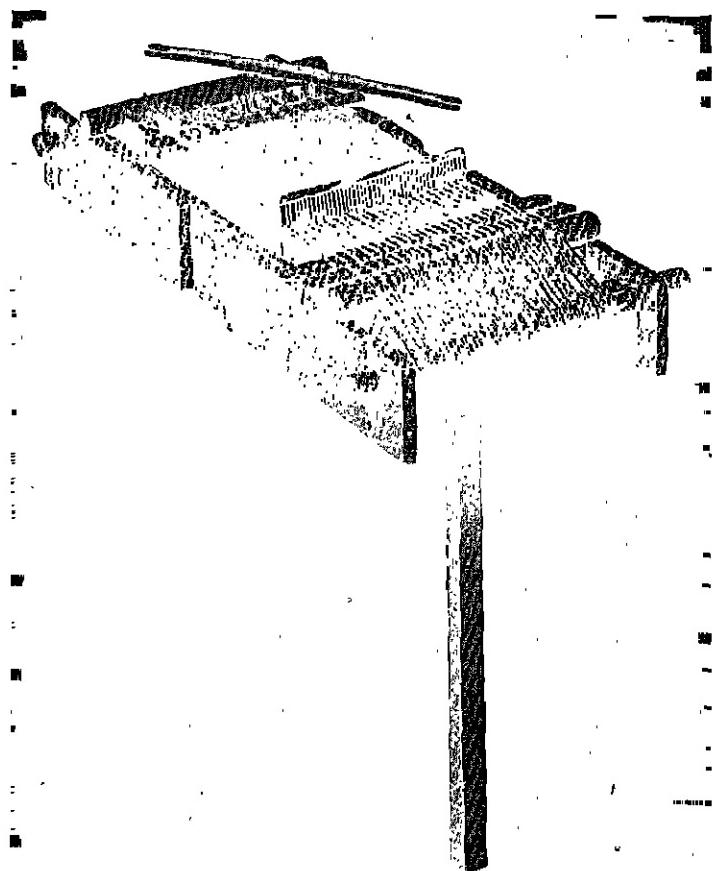


PLATE XI. HOME-MADE LOOM WITH WOODEN SUPPORT

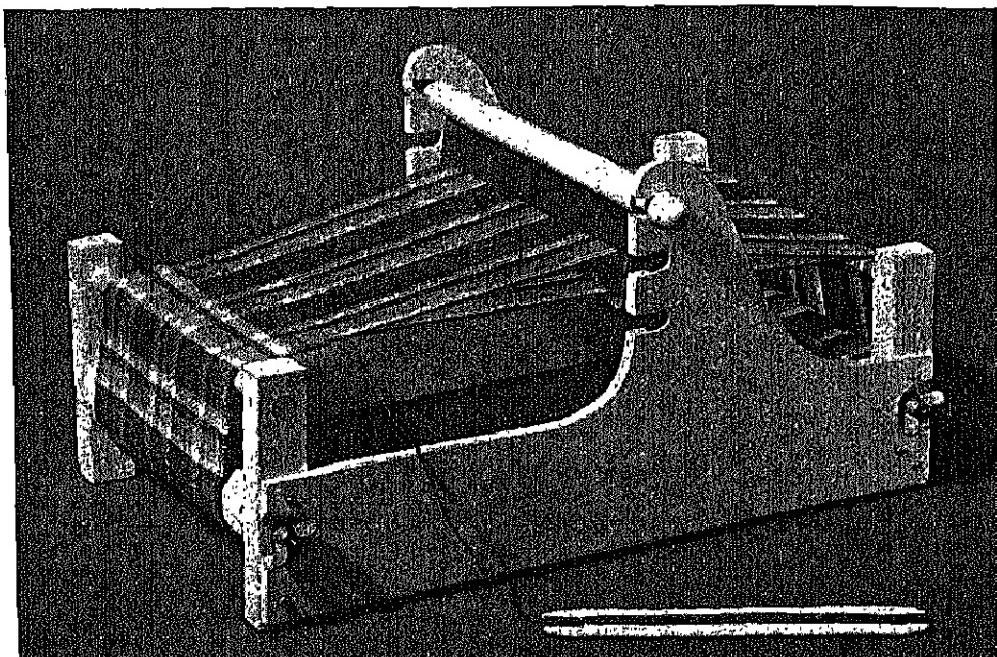


PLATE XII. TABBY LOOM

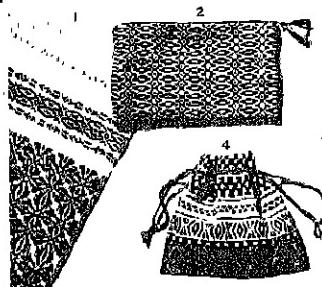
can be slipped, thus keeping the shed open while the shuttle is passed through.

Waist loom.—Children can now use a rigid heddle without any loom at all, as a waist loom, and weave such things as scarves, runners, girdles, braids, etc., quite easily and fairly quickly. These waist looms are still largely used for weaving braids in Germany. Heddles can be bought in varying widths from about $3\frac{1}{2}$ in. and they are made in vulcanite or metal. The former are not very suitable for school use as they break so easily.

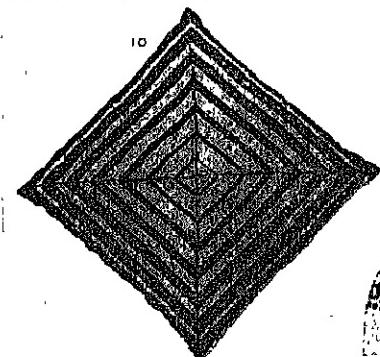
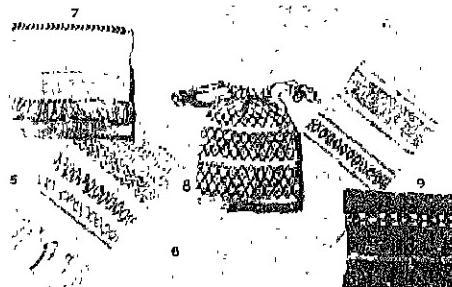
The small $3\frac{1}{2}$ in. heddles can be used most successfully for making braids and girdles in 3-ply wool. The writer set a class of girls to work with these heddles to make girdles for their hockey team. It was amazing to see how quickly the work progressed and how thrilled the girls were with their own efforts. The heddles can be bought quite inexpensively and are quite suitable for use with 3-ply wool, fine knitting cotton, etc.

The metal heddles take approximately 12 threads to the inch. For coarser 4-ply wool (8 threads to 1 in.) a very satisfactory heddle can be made in wood by the children. Fabrics woven on these heddles are particularly pleasing in texture and are very much admired by the really artistic people. The material can be used for scarves, runners, hot water bottle covers, bags, pochettes, cushions, etc., and strips can be joined to make larger articles. The cushion, No. 10, illustrated on Class Picture No. 129, was made from strips woven on the home-made heddle shown alongside the cushion.

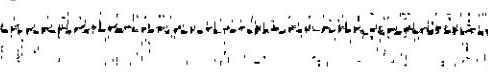
To make the wooden heddle procure some strip wood $\frac{1}{4}$ in. by $\frac{9}{16}$ in. thick and some $\frac{1}{8}$ in. by $\frac{5}{8}$ in. wide (this is stocked by many of the firms which supply school materials). All strips should be well sandpapered. Cut four strips of the wide wood 9 in. long. Two of these are placed horizontally $5\frac{1}{2}$ in. apart and are fixed temporarily by nailing through to a board with panel pins. Cut thirty-six narrow strips $6\frac{1}{2}$ in. long. These are glued



1. Scarf end showing honeycomb borders. 2. Pochette to match Scarf No. 1, black and white 3-ply wool. 3. Scarf in black and white wool woven by child of 13—in original adaptation of an American pattern. 4. Black and white Work Bag—pattern derived in with shuttle. 5 and 6. Two Scarf Ends—Rosepath borders. 7, 8 and 9. Bag and Pochette woven on four heddle box loom (Early experiments in pattern weaving.)



10. Cushion made from strip of weaving done on home-made rigid heddle warp loom (Illustrated). 11. Work Bag woven in natural grey 2-ply wool on table loom. 12. Wool Cushion, natural grey foundation; green (Butternut) pattern. 13. Cotton Cushion, beige with orange pattern (Orange red—threading draft).



15. Needle weaving in cotton mercerized cotton fabric.

WEAVING IN WOOL AND COTTON

- 1. SCARF.
- 2. POCHETTE.
- 3. SCARF.
- 4. BLACK AND WHITE BAG.

- 5. SCARF END.
- 6. SCARF END.
- 7. BAG.
- 8. POCHETTE.

- 9. POCHETTE.
- 10. CUSHION.
- 11. WORKBAG.
- 12. CUSHION.

- 13. CUSHION.
- 14. NEEDLE WEAVING.
- 15. NEEDLE WEAVING.

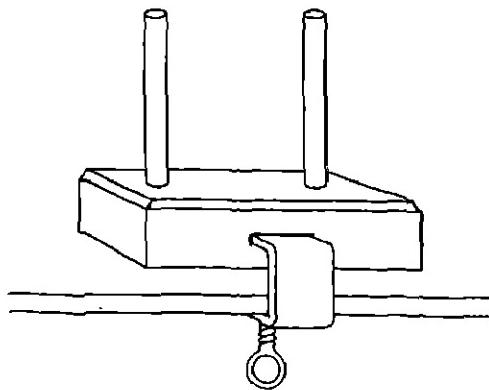
(Class Picture No. 129 in the Portfolio.)
For the description of this Class Picture see page 421.

to the horizontal strips with a space between each (a thin nail can be used for this purpose as the space should be sufficient only for a piece of 4-ply wool to move in it easily). The other two 9 in. strips are now glued on

top of these small strips at the top and bottom so that the narrow strips are totally enclosed between two wide strips. A weight should be put on these and when the glue is dry one or two small panel pins can be

put in to give extra strength. Now draw a line across the narrow strips midway between the two wide pieces. Drill a hole on this line in the centre of each strip, after packing a spare piece of wood underneath the heddle to avoid undue strain on the strips and to prevent accidents to the furniture. The drilled holes may be rather rough at first but will quickly wear smooth as the weaving proceeds. It is advisable to allow a few extra inches of warp on the first piece of weaving for this purpose of smoothing the heddle. A rigid heddle should not be used as a waist loom in greater width than 10 or 12 in., but the wider heddles 15 to 20 in. can, of course, be used on the frame looms described later.

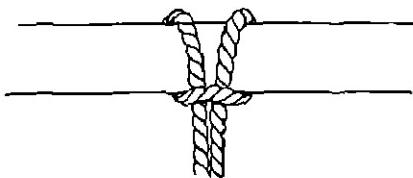
Method of threading up the rigid heddle waist loom.—Decide on the length of warp required and allow 9 to 10 in. extra for tying on to the rods and wastage. A warp should not be longer than 2 yd. for children. Count the number of threads required—one for each hole and one for each slit with two extra threads for each selvedge. Cut half the requisite number of strands but double the length required as each strand is folded in half and makes two warp threads. The warp strands can all be cut the same length by winding the wool round two nails driven in a bench or by using the warping posts, Fig. 14. After folding each warp strand in



WARPING POST WITH CLAMP

FIG. 14

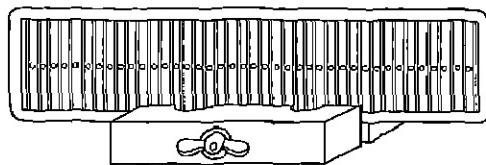
half, the loop is passed under a round rod and the two ends threaded over the stick and through this loop, Fig. 15. All strands should be treated in this way until complete.



LOOP FOR WAIST LOOM

FIG. 15

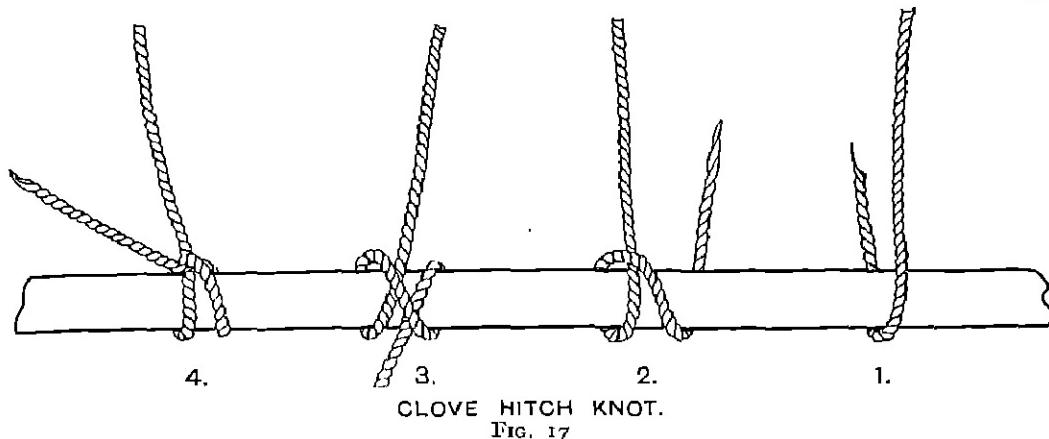
Next fix this rod in two hooks in the wall or behind two nails driven in a bench. The heddle should be fixed in a clamp (Fig. 16) and the warp strands threaded through this and brought towards the worker. The weaver should stretch the warp strands to



HEDDLE FIXED IN CLAMP FOR THREADING

FIG. 16

their fullest extent and tie these to another rod, with a clove hitch knot (Fig. 17) which is fixed to the worker by tying a string or leather strap at one end, passing it round the weaver's waist and tying to the other end of the stick. (The Ecuador loom to be seen in the Victoria and Albert Museum has a wide scarf arrangement in which the weaver sits and so controls the tension of the warp. Experiments could be made with this method.) The clove hitch knot is the best for this purpose as it need not be untied when the weaving is finished, but can slip off the rod, the ends of the wool being used for a string. After tying one or two strands at the right-hand side of the warp, a few should be tied at the left so that an even tension can be kept throughout the warp. A hook can be made for threading the wool through the heddle. This is easily made from an old



corset support by filing a hook at one end. Plate XIII shows a variety of such hooks and they form one of the most useful parts of a weaver's equipment. Nos. 1 and 3 are bought for the purpose, the others are home-

made. No. 4 is the easiest to use as the wide handle makes it easy to grip and control.

An alternative method of fixing the warp is to leave the end of the warp, away from the worker, free. This is then combed out

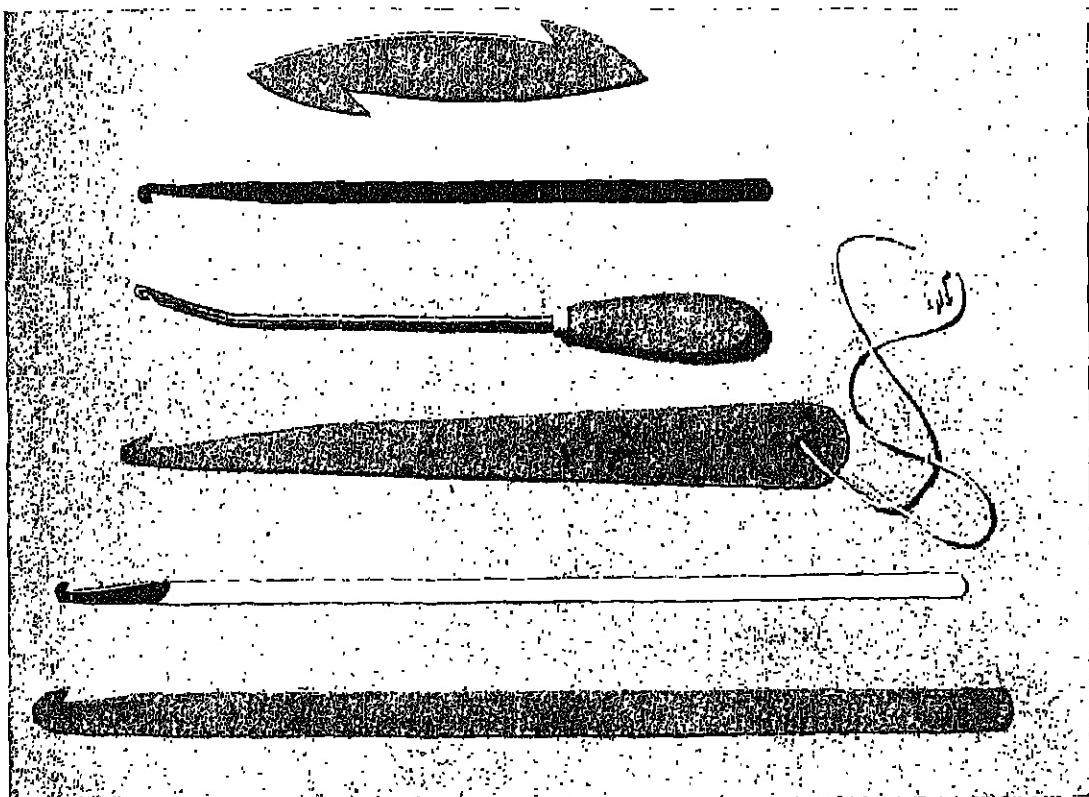


PLATE XIII. VARIETY OF REED HOOKS

with the fingers to eliminate any loose threads and knotted together by another child and tied to a hook with a piece of string, or alternatively the warp strands can be passed over the back of a chair and tied firmly. These warp strands have to be retied from time to time as the work proceeds. The weaver sits in a comfortable position

to keep to one method; i.e., pass the shuttle from right to left as the heddle is raised and from left to right as it is lowered. If a teacher insists on this method she will find it much easier to correct faults as she goes among her pupils. As the work proceeds it can be rolled up on the rod near the worker if the string is first removed from one end. A flat



PLATE XIV. GIRLS AT WORK WITH WAIST LOOMS

and by leaning forward or back she can regulate the tension of the warp. Plate XIV shows children working on this type of loom. Before beginning to weave a flat stick is threaded under alternate strands to give a firm edge for beating up the west. The west is now wound on the shuttle and passed through the sheds as the heddle is raised or lowered. To prevent confusion it is better

stick should be placed *under* the roll of material and firmly tied at each end to the original rod to prevent the roll from slipping.

Equipment for finer work.—As the rigid heddles do not permit of finer work than 12 to 14 threads to the inch, other types of equipment will now be introduced. The leashes previously described can be used

but as they have to be made for each warp they become rather tedious. Children can now consider a method of fixing the heddles on a frame as a more permanent piece of apparatus which can be used over and over

again. Two such heddles will be made to take the place of the shed stick and leashes previously used. Any type of box loom can be used and frames for the heddles are made from strips of wood of such a width

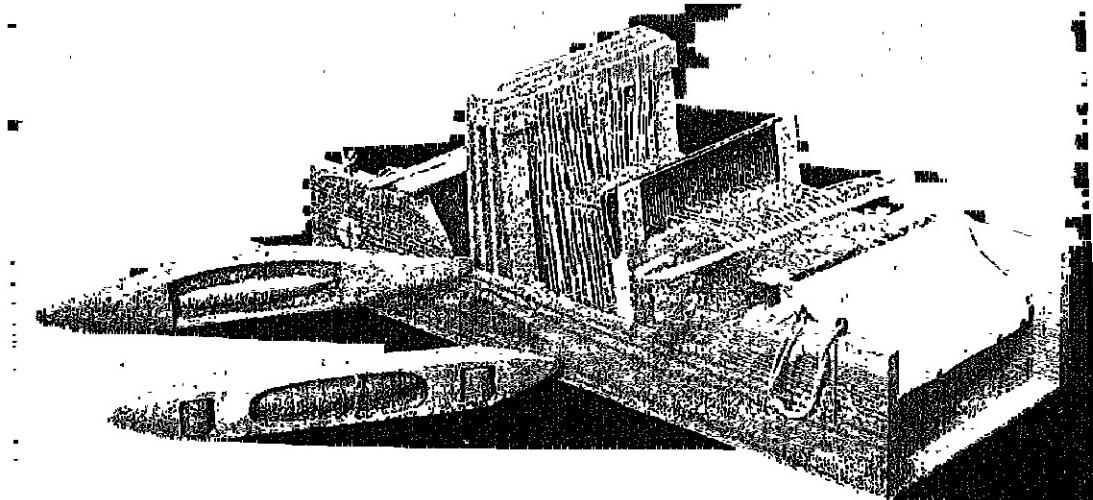


PLATE XV. FOUR-HEDDLE BOX LOOM

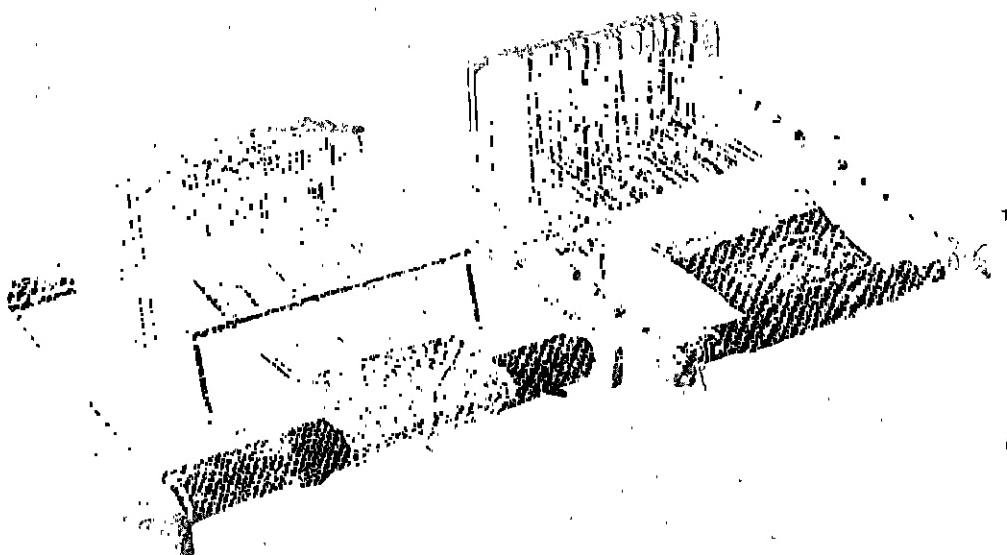


PLATE XVI. HOME-MADE LOOMS WITH FOUR HEDDLES

that they will fit easily in the box. As the heddles will now be raised only, a shallow box will suffice. Plate XV shows a box loom with four heddles and Plate XVI shows two looms made by children of eleven, each with four heddles made from slate frames. The looms could be used with two heddles only in the early stages. The heddle strings are made as shown in Fig. 18 by tying strings of equal length around nails in a board. The heddles must be sufficiently long to allow the warp to move up and down quite freely. The centre loop of the heddle string should be in line with the top of the box. If the box is 3 in. deep, the heddle strings should be 6 in. and made as follows:—

Fix nails without heads into a board 6 in. apart and mark the centre between these two nails. Fix a nail $\frac{3}{8}$ in. away from this point on either side. Take some fine string or cotton a little more than double the length of the heddle required. Fold in half and slip

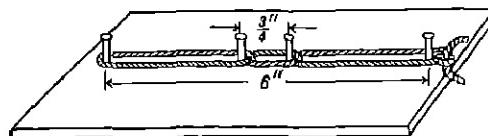


FIG. 18. METHOD OF MAKING HEDDLES

the loop over the top nail; carry the ends down to the next nail and tie firmly round this. Then take the string round the third nail and tie again, and finally carry it down and round the fourth nail and tie with a firm knot. Continue in this way with other pieces of string until the requisite number of strings have been made, when all can be slipped off the nails together. The number of strings required will depend upon the width of material to be woven. If a piece of material 12 in. is to be made and there are to be 16 threads to the inch, then 192 heddles will be necessary. This means that 96 heddles will be threaded on each frame. The loops are threaded on to the top and bottom strip of the frame and while the strings are held taut, the side strips of the frame are nailed on. If the frame is fixed; e.g., a slate frame, the heddles can

be tied directly on to this or fixed on a rod which is attached to the frame at each end. The two heddle frames are now put into the box and each warp strand must pass alternately through the centre loop of a heddle on frame No. 1 at the front of the loom, and No. 2 at the back. Two extra threads should be allowed at each end to form a selvedge, so two threads will pass through the first heddle and two through the second. When the warp is tied round the box the children will see that by raising each heddle in turn one set of alternate strands is raised. A flat stick can be put into each shed as it is formed, to beat up the weft, or the weft can be pressed together with a coarse comb. Better work is possible if a reed is used. A reed or comb, consisting in the early stages of primitive looms of a number of reeds bound together at the top and bottom, was used very early in the history of weaving. Modern reeds are made from strips of thin steel fastened into a framework, and these form an important part of a weaver's equipment. They can rarely be made satisfactorily by amateurs. Reeds are supplied in varying sizes and with any number of "dents" to the inch. One thread is usually passed through each dent but, for finer work later, two threads can pass through each dent. This is not only easier to thread but is an economy in equipment as a reed which takes 14 threads to the inch for wool can be used for cotton 28 threads to the inch, passing two threads through each dent. When a reed is used the warp strands are passed through this after going through the heddles. Heddles, therefore, are used for raising the threads and for pattern formation, whilst the reed is used for spacing the threads and for beating up the weft.

Rug weaving.—Having dealt with the use of leashes, rug weaving can now be introduced to the children. A loom can be made quite satisfactorily from an old picture frame. This should be marked off in inches across the top and bottom of the frame. The warp of pliable string or soft cotton is

taken right round the frame, keeping as even a tension as possible and allowing about 6 or 8 threads to the inch. Double strands of thin cotton or string are better than one strand of very thick material. Place a flat piece of wood at one end of the frame and take the warp over this. As the warp stretches during the weaving process other sticks can be driven in between this and the frame. Shed stick and leashes are now introduced as previously described for the board loom. This is the simplest type of rug loom but with little more trouble a more permanent loom can be made from a stronger frame, Fig. 19.

A piece of dowel rod or broom handle is tied to the frame a few inches from the top at point X. The warp is wound round and round the frame but it passes alternately under and over this rod making one permanent shed. Now fix a pair of angle brackets about 6 to 7 in. from the top of the frame. Another rod Y is fixed to these brackets and a piece of string passes from one end of this to the other. The leashes are fixed on to this string. These are made of thin string in one continuous length so that they can be used over and over again. Next take another rod Z rather longer than the width of the frame and thread it under all the strands which have not been picked up on the rod X. Fix this temporarily to the frame about 8 in. below bar Y (as it is only to be used as a gauge while making the leashes). Now tie the leash string to the end of the string on bar Y, beginning at the left. Take it under this bar, down and under the rod Z and the first warp strand—over bar Z and back to the string on bar Y where two or three blanket stitches are made. Pass the

leash over bar Y down and under Z and the next warp thread up to bar Y and make three more blanket stitches on the string. Continue until all leashes are made, when rod Z can be removed. Rod Y remains. The work may be too wide for all the warp strands to be lifted at once, so the shed is made by pulling groups of leashes with one hand while the shuttle is used with the other. Before weaving, thread a flat warp stick under one alternate set of strands at the edge of the frame nearest to the worker, to give a firm edge for beating up the weft. The weft can be pressed closely together with a coarse comb or blunt needle. In later work the children can be introduced to the heavy metal comb supplied for this purpose. As the weaving proceeds the work is pulled round the frame. To simplify this, the warp strands could be tied on to a roller in the way described for the board loom. Very attractive mats can be woven in single 3- or 6-ply rug wool, thrums (oddments of

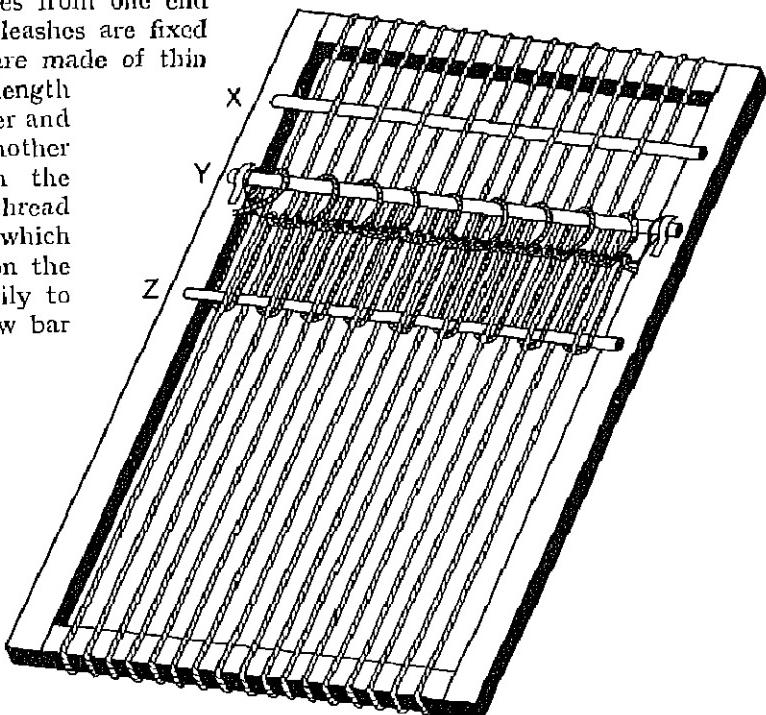


FIG. 19. HOME-MADE RUG LOOM. X, Y, Z, BARS

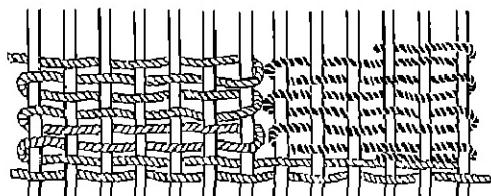
wool from carpet factories), rags, jute, and in rush and string on a strong warp. This simple equipment will suffice for the flat woven rugs, pile rugs, and for finer tapestries for stool stops, bags, etc.

Rug weaving is akin to tapestry weaving and needle weaving, the chief characteristic being a warp which is entirely covered up with the weft; hence the warp threads must be spaced fairly wide apart and the weft beaten up closely. The simplest type of pattern for rug weaving is horizontal stripes of colour in the weft, and vertical stripes produced by weaving alternate rows in one of two colours for a few inches. By changing the shed through which each colour passes, a check pattern results. An advance on this

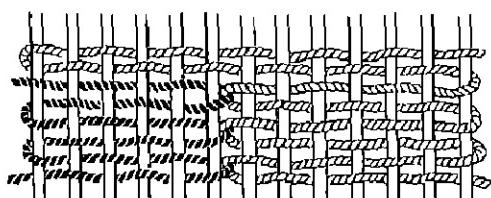
is tapestry weaving where one colour is passed over a few strands only, so that in a rug woven in blue and grey, blue is taken backwards and forwards over one-third of the warp, and grey over a group of threads at either side. The children will realise that there will be a slit between the colours (Fig. 20, No. 1) so the weaving should not be continued for more than a few rows. If patterns with indented borders are used, this slit is avoided. Another method of avoiding this is to take the same warp strand for the edge of each block of colour, and pass round this each time, (Fig. 20, No. 3). Other methods adopted by some of the older weavers are: (1) to link the two threads together each time (Fig. 20, No. 2) but this is a slower process; or (2) to have a plain row known as a tabby row or binder after each pattern row. Children should study some old tapestries if possible and discover for themselves which method has been adopted. They may find in some pieces of work that the slits have been left and sewn together afterwards.

Children should plan out their patterns on squared paper as indicated on Fig. 21. A simple piece of tapestry weaving should be done on a card or board loom and experiments made with various types of pattern. Plate XVII shows girls at work on rug looms. Needle weaving is similar to tapestry weaving but in this case the weft threads are removed from an existing piece of fabric and a pattern is darned on this strip of exposed warp strands with a needle. Class Picture No. 129 shows two interesting pieces of needle weaving, Nos. 14 and 15, one done on a piece of hand-woven fabric. A coarse material can be bought suitable for rugs with borders of needle weaving. Though rugs made in this way are quite attractive, they are far less satisfying to a weaver than a rug made entirely by herself. Fig. 22 shows another type of weaving suitable for rugs—Soumak weaving. Each pattern row is followed by a row of tabby weaving in a finer thread of the same colour.

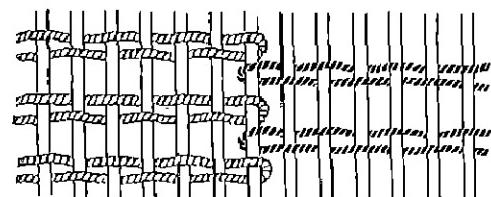
Pile rugs can also be woven on this type of frame loom and different colours can be



1.



2.



3.

FIG. 20. TAPESTRY WEAVING

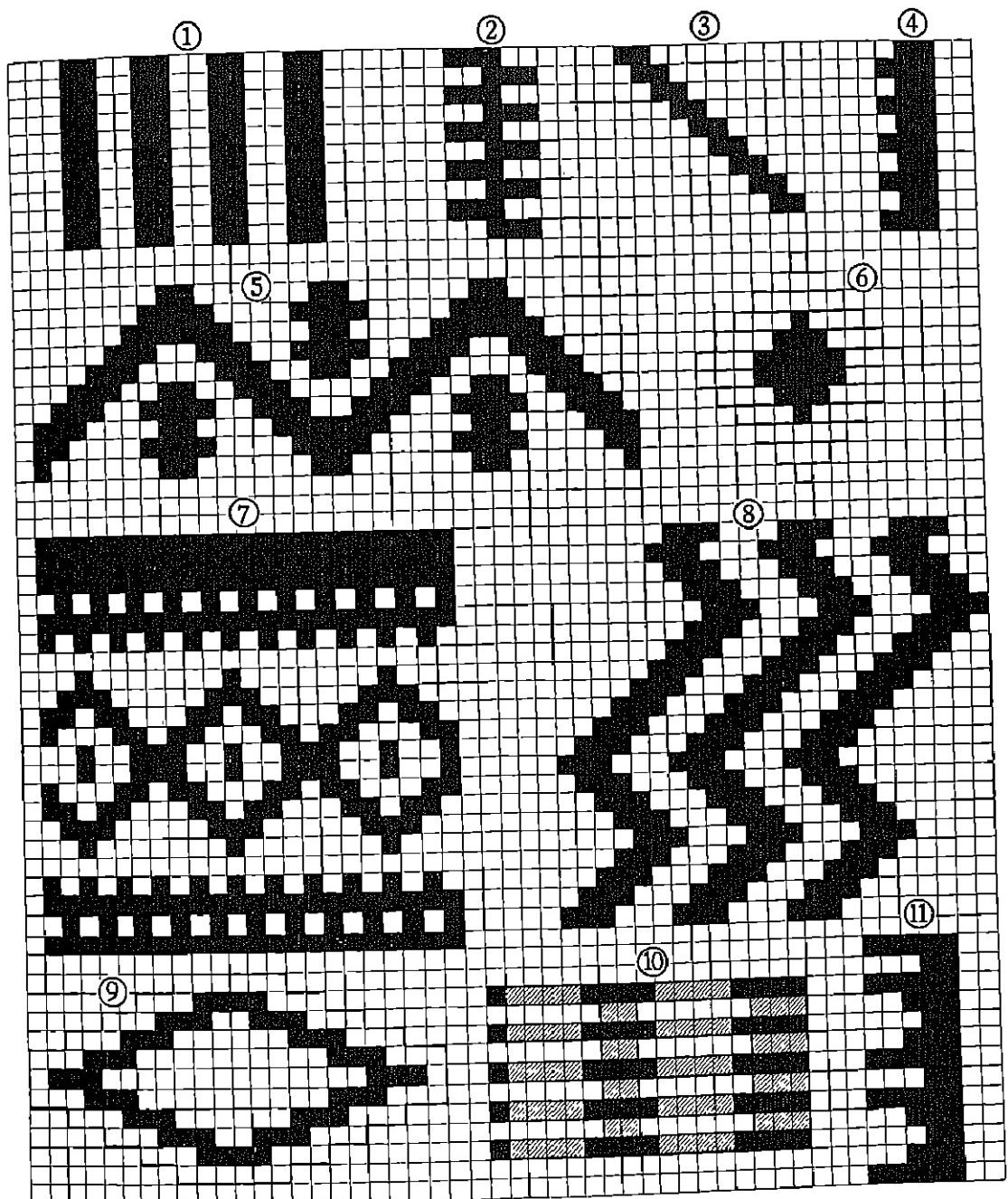


FIG. 21. MOTIFS FOR RUG AND TAPESTRY WEAVING
Nos. 4 and 11 show patterns for edges

added at any stage without the difficulties involved in the flat woven rugs. This type of pile rug is similar to the rugs made on canvas by so many people to-day, but has the added attraction of being made throughout by the worker. A pile rug consists of a string or cotton warp with rows of hand-knotted

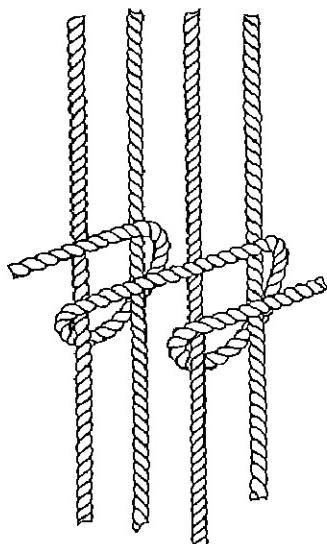


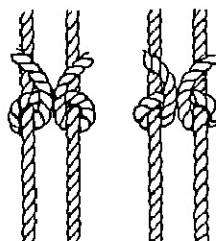
FIG. 22. SOUMAK WEAVING

pile divided by two rows of tabby weaving in a fine weft thread. The same types of wool can be used for weft as suggested previously. The simplest type of knot is known as the ghiordes knot and this can be used quite successfully by children. The weft is cut into lengths of about $2\frac{1}{2}$ in., a wooden gauge being used for the purpose. First weave several rows with string, then fold one piece of wool into two and place the centre over the first two warp strands (6 to 1 in.) starting from the left side of the rug. Take the two ends of the pile under these warp strands and up between the two strands, pulling them slightly towards the worker, Fig. 23.

Continue in this way until a row of knots has been made right across the warp, then insert two rows of tabby weaving with string (which will be entirely hidden by the wool pile). Beat these firmly and add another

row of pile. Continue in this way until complete.

Four warp strands should be allowed for the selvedge at each side, and these strands, used in pairs, should be covered with the same wool as is used for the pile. When the first selvedge is reached take a long piece of wool. Insert the end of this between the two pairs of warp strands, leaving the short end on the top. Take the long end under the outer pair of strands, over these and down between the two pairs, then under the inner pair of warp strands, over this and down between the two pairs leaving the long end there until two more rows of tabby weaving have been done and another row of knots added. Then take the long piece of wool under the outer pair of warp strands and proceed as before. The simplest way to finish off the rug when it is removed from the loom is to knot the warp strands in bunches of four or six, pushing the knots close to the weaving, and leave the ends to form a fringe. If a fringe is not desired the ends can be cut off below the knots, turned under and stitched to the back of the rug. A strip of binding can be added to neaten the ends.



GHIORDES KNOT.

FIG. 23

Another useful rug loom is a frame with rollers and a rigid heddle made from strip wood as previously described. This is one of the easiest types of loom to use and as it abolishes the need for shed stick and leashes, the work proceeds at a much greater pace (see Plate XVIII). Children work with this type of loom quickly and easily and



PLATE XVII. TAPESTRY WEAVING ON HOME-MADE LOOMS

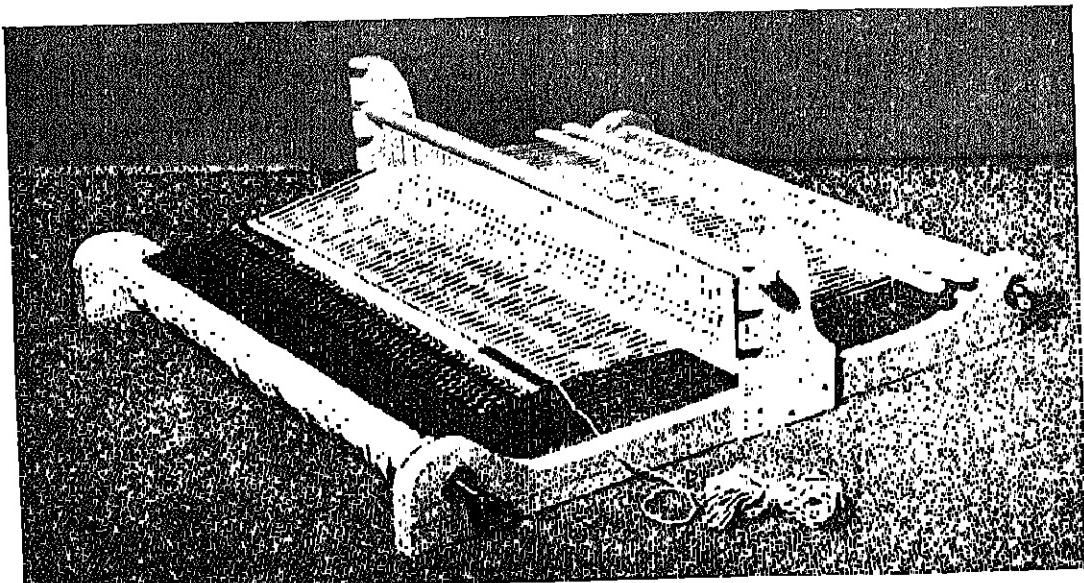


PLATE XVIII. RUG LOOM WITH RIGID HEDDLE

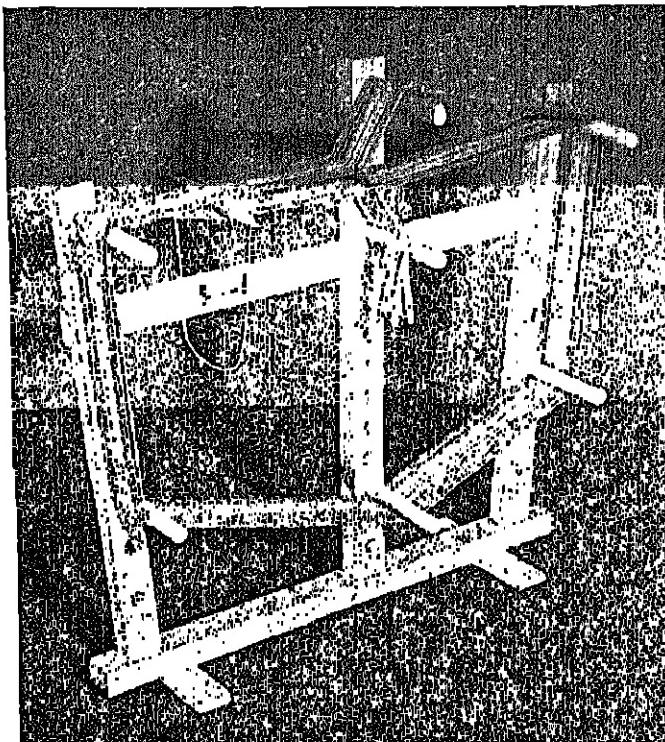


PLATE XIX. SCOTTISH INKLE LOOM

produce some attractive flat woven and pile rugs. A loom of this type should find a place in every school as it can be made quite easily by the children themselves when they have had some experience in fixing rollers or it can be made in the wood-work centre.

When the children have had experience in working with leashes they can be introduced to the "Scottish inkle loom" (Plate XIX) for making braids with warp patterns.

IV. MORE ADVANCED LOOMS

TH E length of the weaving up to this stage has been somewhat limited, as the warp strands have been tied round the frame or box, and resulted in a strip of woven fabric not quite double the length of the loom. The Solomon Island loom on Plate I shows a warp of limited length in accordance with the size of the loom.

Roller loom.—The children will now feel the desire for a warp whereby a longer piece of fabric can be produced. This same desire was felt by primitive people. Many primitive weavers dealt with this problem of a longer warp by rolling the spare warp

round a stick fixed in the ground (see Plate VI). This loom also includes the two heddles and a reed, mentioned earlier, but the former are pulled down by pedals instead of being raised as suggested for the box loom. The waist loom described in the previous section permits of a longer warp than the board loom because the end of the warp can be knotted at any point and tied to a hook. As the weaving proceeds, the fabric is wound on to a roller and the weaving continued.

No date can be fixed to the introduction of a roller in place of the earlier cross beam, but it is to be found in looms of ancient history. The children must now attempt to devise some means of adding rollers to their

looms, so that longer warps can be used. The main difficulty to be overcome is the method of fixing these rollers to avoid slipping and a consequent slackness in the warp. Plates IX–XI show a variety of roughly-constructed looms made by a class of seniors from odd boxes, broom sticks, etc. The cost of these looms is negligible, the only expensive part being the metlyx heddle, an absolute necessity for good work.

One of the most satisfactory and inexpensive methods for fixing rollers is to allow the roller to project 1 in. beyond each side of the box. Two holes are drilled diagonally right through the rollers at one end of each, Fig. 24, No. 2. A hole is also drilled vertically through the side of the box at point A. A nail or large cotter pin is passed through this hole and one of the holes in the roller, and thus holds the roller firm.

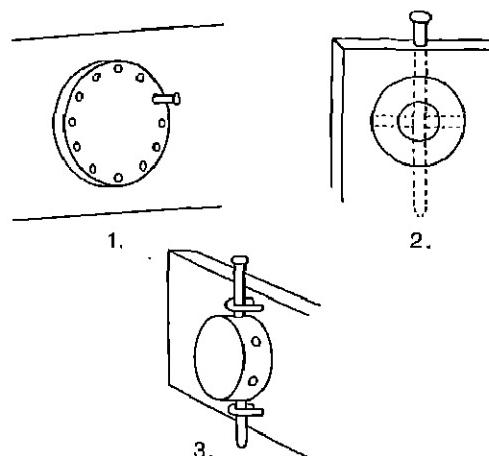


FIG. 24. METHOD OF FIXING ROLLERS

Another method is shown on Fig. 24, No. 3. The roller projects about 1 in. from the side of the box. Four holes are drilled vertically through the end of the roller, and a staple is fixed in the sides of the box above and below the roller. A nail passes through the staple at the top and one hole in the roller and then through the second staple. This keeps the roller absolutely rigid. The same method is adopted for the other roller.

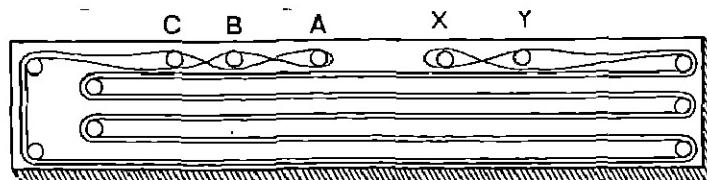
Another method is to nail a circular disc

of plywood on to one end of each roller. This disc has a series of holes drilled about $\frac{1}{2}$ in. apart on a circle drawn $\frac{1}{2}$ in. inside the circumference. Similar holes are drilled in the sides of the box and a peg is inserted through any hole in the disc and the corresponding hole in the side of the box after either the warp or the fabric has been wound on the roller, Fig. 24, No. 1.

Many bought looms have a ratchet and pawl at the end of the rollers and this could be adopted on any of the home-made looms. If children are really keen they often succeed in arousing interest in parents or brothers and some most ingenious looms have been made in this way by an interested father.

The chief points to remember in making a loom of any type are: (1) the rollers must be firmly fixed; (2) all working surfaces must be well sandpapered and smooth; (3) any loom of the frame type must be strong to avoid warping and pulling out of shape.

Making and setting up a warp.—Having made or bought a loom with rollers to enable a longer warp to be used, children now learn how to make a continuous warp. The details of the procedure should be thoroughly taught at this stage so that by the time the children reach the stage for more advanced looms, warp making will present no difficulty. Warping posts, as shown in Fig. 14, are quite useful for school purposes and will suffice for any but a very long warp. The posts can be made quite cheaply and easily and a number of these should be available. If a round rod about $\frac{3}{4}$ to 1 in. diameter is bought this can be cut into lengths of approximately 6 in. A piece of wood about 1 to $1\frac{1}{4}$ in. thick should be provided for the bases and a $\frac{3}{8}$ in. or 1 in. hole (according to the size of the post) should be drilled in this with a brace and bit. The posts can then be glued in position. A number of single posts and a few pairs should be made. These are clamped down to the edge of a table or desk with a small clamp which can be purchased for a few coppers. If a number of single posts is provided these can be



WARPING BOARD

FIG. 25. C, B, A, X, Y, PEGS

clamped at intervals down the two sides of a table. The warp can then be taken round a post on one side, across the table to the other side and round a post and so on till the last post is reached. This enables a long warp to be made but this type of working equipment is not recommended for a warp more than 5 to 6 yds. in length. For longer warps than this it is better to use the more sturdy warping board shown in Fig.

25. This consists of a series of pegs fixed in a strong board which will stand across a table or two desks or hang on a wall, and the threads are taken to and fro across the board and around the pegs as before. Some warping boards are fixed on the wall and if space is

available it is a good plan to fix two T-shaped boards (in which pegs 1 in. in diameter are inserted) on a wall about 1 yd. apart, the order of fixing the boards being reversed (see Fig. 26). A child can then stand in front of these boards and take the warp threads from the board on the left to the one on the right and so on until the warp is completed. Plate XX shows an old Scotch weaver making a warp on a board

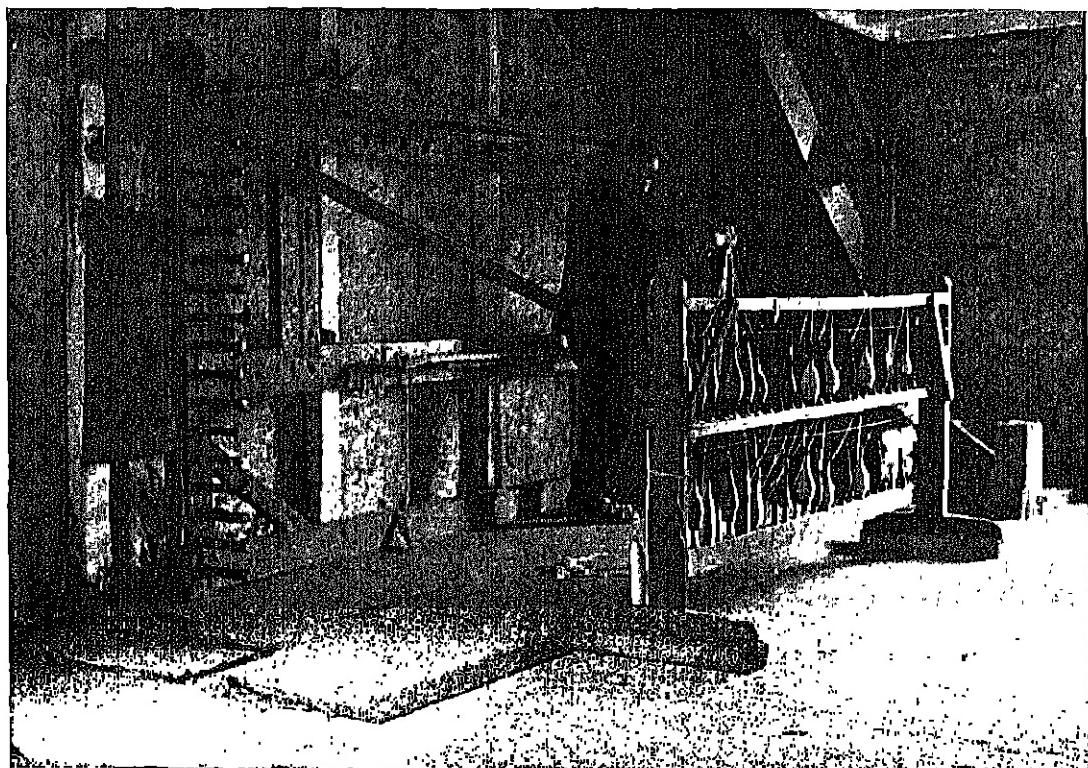


PLATE XX. MAKING A WARP

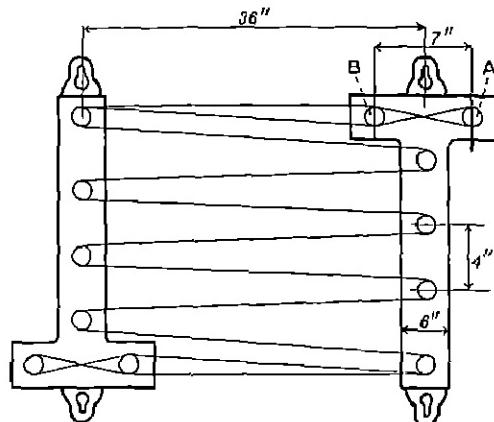


FIG. 26. WARPING BOARD. A, B, PEGS

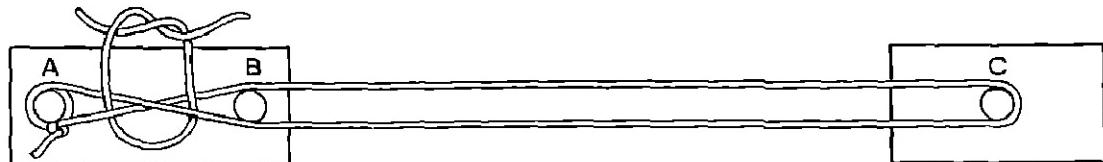
fixed to the wall and this method is still adopted in many of the factories to-day.

Children should be led to appreciate the ingenuity shown by primitive weavers in inventing a method whereby a warp of many hundreds of threads is made and fixed to the loom, without any possibility of a tangle. This is made possible by the cross in the warp still used in every type of loom in use in the factories of the present day.

Before making any warp, the children must decide how many threads are required. A scarf 12 in. wide, having 14 threads to the inch will require 168 threads, to which must be added an extra 4 so that two double threads can be allowed for the selvedge at each side. Though warps are often made with two or more threads at a time, children will at first find it easier to make a warp with a single thread. If a hank holder is not available the wool should be wound into a ball and put into a jar or box on the floor. The double warping post; i.e., the one block with two posts, should be fixed

to the table and a single post fixed at the required distance from this, according to the length of warp required; e.g., 2 yds. It is not advisable to have too long a warp at the start though it is more economical to make a warp sufficiently long for two or three scarves at a later stage.

Fix the end of the wool to Peg A, Fig. 27. Take it over peg B across to peg C round this, back to peg B, under this, over peg A. Take the thread under peg A, over B across to C, round this and back under peg B. It will be seen that the threads cross each other between pegs A and B, and this is the important part of the warp and must be retained carefully at all costs. The children must count the threads as they are warped and to simplify the task of counting and checking such a large number of threads they should be tied in bundles of 14, as this is the number of threads to the incl. Twelve bundles of 14 threads will be required. A strong piece of cotton or fine string should pass down between the threads at one side of the cross and up between the threads at the other side of the cross, and should be tied in a knot. The ends of string are left for tying each bundle of 14 threads as it is warped. Fig. 27 shows the method of tying this cross. When the warp is completed the wool must be broken off and tied to the peg at whichever end of the warp it finishes. Before removing the warp from the warping pegs an extra string should be threaded down one side of the cross and up through the other as before. An extra strand should be tied through the loops at A and another at C. The warp is then ready to be taken off the posts. To do this slip the right hand through the loop at C, grasp the whole warp in front



CROSS IN WARP

FIG. 27. A, B, C, PEGS

of this loop with the left hand and draw it through the loop on the right hand. Hold the loop and continue grasping and pulling the warp through the loop. This is really a crochet chain, but is made with the hand instead of a hook. If the warp is not being used straight away, the loop left on the right hand when the end of the warp is reached is tied to the end of the warp which is slipped off peg A. The warp can then be left without fear of tangles.

If a longer warp is made with a number of pegs the process is exactly the same except that the warp travels to and fro around the various pegs until the last one is reached, when it follows the same track back to the first pair of pegs where the cross is made, as before.

After gaining confidence in making a warp, the children can warp two threads at a time. This is useful if a warp of two colours is made. Two balls of wool are necessary, one in each of two jars. The two ends are tied together and passed over peg A, taken over peg B across to peg C, round this back under B, over and round A, and so on as before. One finger should be kept between the two strands the whole time to prevent twisting and to keep an even tension on both threads. While each bundle of 14 threads is being tied, the warp wool should be wrapped a few times round one peg so that the threads in the warp already made do not become slack.

The warp shown in the process of being made on the warping board (Fig. 25) has three crosses, one between A and B, one between B and C, and another between X and Y. This is the method adopted by many weavers but only one cross is absolutely necessary. The same method as suggested above can still be used and the unnecessary peg removed as in this case pegs are made movable for convenience in use, as all pegs are not always required.

The method of fixing the warp on the loom is now dealt with. It is better and almost essential for two children to work together for this part of the work. Take three flat

shed sticks with a hole drilled at each end. A stick is threaded through the warp at each side of the cross, and these two sticks are tied together at each end to prevent them from slipping out and thus losing the cross. The warp threads must now be passed through the reed from front to back. As this is only for spreading out the warp, the threads need not pass through each dent of reed, but four threads or two loops can be passed through every fourth dent of the reed. (If a rigid heddle is being used with holes and slits, four threads will pass through every other slit.) One child sits in front of the reed, which is fixed in a clamp, and the other sits behind. The child at the front now removes the strings marking the cross in the warp and, pulling the chain of wool taut, finds the first strand of the warp and passes this together with the next pair through the first dent of the reed to the child at the back, who draws the threads through with a hook. Plate XIII shows various types of hooks for this purpose. The child at the back slips the loops on to the little finger of the left hand. The next two loops are drawn through the fourth dent from this and so on to the end. When the child has more loops than can be conveniently held on the finger, she slips them on to an extra flat stick, ties a string from end to end, and collects another bunch on her finger.

When all threads have been passed through the reed and slipped on to the stick, the clamp can be removed, when the warp is ready to be wound on the roller. Each roller of the loom should have a 6 to 8 in. strip of calico (with a deep hem) attached. A flat stick is slipped through this hem on the warp roller and a series of holes or eyelets is made through which a string loop is passed. The stick on to which all the warp strands were slipped after passing through the reed is now, by a series of string loops, attached in several places to the stick in the hem of the calico on the roller or warp beam.

The cross in the warp preserved by the two sticks, "shed sticks," is now at the front of the reed and must be transferred

to the back. The shed stick nearest the reed should be turned on its edge near the reed (after the string joining the two sticks together has been unfastened). All loose threads should be combed with the fingers and the warp held taut by the child at the front of the reed during this process. The stick forms an opening or shed behind the reed and a flat stick should be passed through this temporarily and pushed towards the back of the loom. The shed stick on edge in front of the reed is now removed and takes the place of the temporary one. The other shed stick still in front of the reed is now turned on edge and the same process followed, until the two permanent shed sticks are now at the back of the loom and should be tied together at the ends again. These must be pushed near the reed while the warp is being wound on to the roller or warp beam. The child at the back of the loom winds the warp on while the one at the front combs out the tangles and holds the warp taut, particularly at the two edges. If the selvedge threads are slack, great difficulty will be experienced in keeping good edges to the woven fabric.

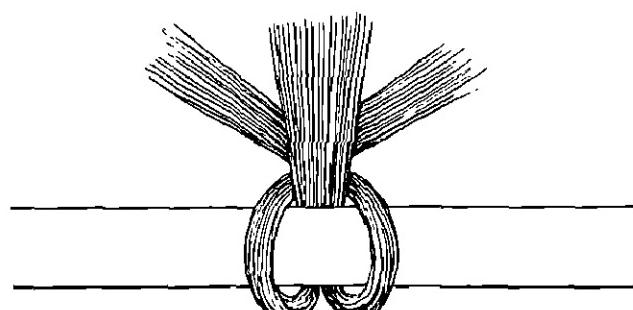
As the layers of warp are wound on the roller they should be separated by flat sticks (warp sticks) at frequent intervals, placed in such a way that they follow the contour of the roller. When the loops at the end of the warp are nearing the reed the two shed sticks at the back of the loom should be drawn to the warp beam and tied to this to prevent them from slipping.

The loops at the front of the roller are now cut and the warp ends are drawn through the reed and tied in small bunches at the back of the loom when they are ready for threading through the heddles and again through the reed—this time with a thread through each dent ready for weaving. If two heddles and reed are used as suggested for the box loom, each strand is taken alternately through a

heddle on each of two heddle frames, then through a dent of the reed (14 dents to the inch). Two double threads are used for each selvedge. If the reed is wider than the width of material the warp must be spaced evenly in this; i.e., if the reed is 20 in. across and the warp 12 in., then the warp will stretch to within 4 in. of each end. If a rigid heddle is used the warp strands will pass alternately through a hole and a slit. When a few threads have been "entered," i.e., passed through the reed, they should be loosely tied in a half bow in front of the reed.

When all have been entered the warp is now ready to be tied to the front roller. A stick is now threaded through the hem in the calico on the front roller and another stick is tied to this. The warp is now tied to this in bunches as shown in Fig. 28 (about 20 threads should form a bunch). Bunches should be tied alternately at the right and left of the warp with a single knot. The tension of the warp must now be tested and corrected and when the worker is satisfied that all threads are of an even tension the bunches should be tied with a double knot. A stick should now be inserted through one shed, made by working the heddle, when all is ready for the weaving process.

This method of "setting up" a warp is adopted for all types of loom and needs very little modification even for the advanced table and foot power looms which will be dealt with later.



METHOD OF TYING WARP TO FRONT ROLLER

FIG. 28

Pattern weaving.—Having had experience in weaving scarves, runners, braids, etc., on looms with rigid heddle and also with two heddles and reed for plain weaving, another stage in the history of weaving is reached, that of the introduction of other labour-saving devices for pattern weaving. Leashes can be used for pattern weaving in a way similar to that used for tabby weaving but extra sets of leashes must be added.

Experiments can be made with these on a board loom. The box loom previously used with two heddles for plain weaving can now be used for pattern weaving if two additional heddle frames are added (see Plate XV). If the warp is now threaded in the order of 1, 2, 3, 4, one thread passing through a heddle on each of the four heddle frames before passing through the reed, the children can experiment with the twill patterns, which up to this stage have been darned in with the shuttle. The heddles are numbered and marked, 1, 2, 3, 4, from the front to the back of the loom—this method of numbering being maintained throughout the course—whatever the type of loom in use.

Each heddle frame raises one thread out of four so that to raise one set of alternate threads for tabby weaving heddles 1 and 3 must be raised, and 2 and 4 for the other set.

As this pattern or "thread up" is somewhat limited, another simple pattern should be chosen for these early experiments on the four-heddle box loom, or frame loom. The box loom (Plate XV) and the frame looms (Plate XVI) are excellent for demonstrating the principles of pattern weaving as the children can easily handle the heddle frames and see the exact process each time. The "rosepath" threading draft, No. 1 on Fig. 29, is an excellent one for general purposes. It consists of eight threads to each pattern 14321234. Threading drafts are read from *right to left*. This means that the first thread passes through a heddle on No. 4 heddle frame, the next through one on frame No. 3 and so on until the eight

threads are entered. This order is followed until the whole warp is threaded. The selvedge is threaded 1234, two double threads passing through the reed at each selvedge. As this pattern involves 8 threads the total number of warp threads should be divisible by 8 to make a complete set of pattern repeats. In some cases the order of threading the selvedge threads must be reversed to fit in with the pattern and prevent two neighbouring threads from passing through the same heddle. As the last pattern thread in this case is 1, the first selvedge thread at the left of loom should pass through No. 4.

After the threads have been passed through the heddles, they pass through the reed and are tied on to the front roller as before.

If the children raise heddles 1 and 3 one set of alternate strands will be raised, while heddles 2 and 4 raise the other set. Pattern weaving becomes possible by raising heddles in either of the following combinations:—1 and 2; 2 and 3; 3 and 4; 1 and 4; or three heddles can be raised at once. The children will soon realise that if heddles 1 and 2 are raised the others remain down. Several patterns should be woven with a "binder" or "tabby" row between the pattern rows. The weaver will realise that patterns can be woven more expeditiously in this way than by the old "darning-in" methods.

In order to leave the hands free to deal with the shuttle during the weaving process, a small piece of wood can be placed under the heddles to be raised and rested on the other heddle frames.

The children should now draft some patterns on squared paper similar to those shown on Fig. 29. Four rows of squares should indicate the four heddles and should be numbered from top to bottom, 4, 3, 2, 1, on the right-hand side of the paper, No. 1 being the heddle nearest the front of the loom. The threading draft of 8 threads should be indicated on these four lines of squares. The pattern drafts should be indicated below this threading draft and to simplify the making of these in the early stages

Heddle combinations

1 and 2 for Plain weaving

2 " 4 " " "

1 " 2 " Pattern "

2 " 3 " " "

3 " 4 " " "

Upper side 1 " 4 " " "

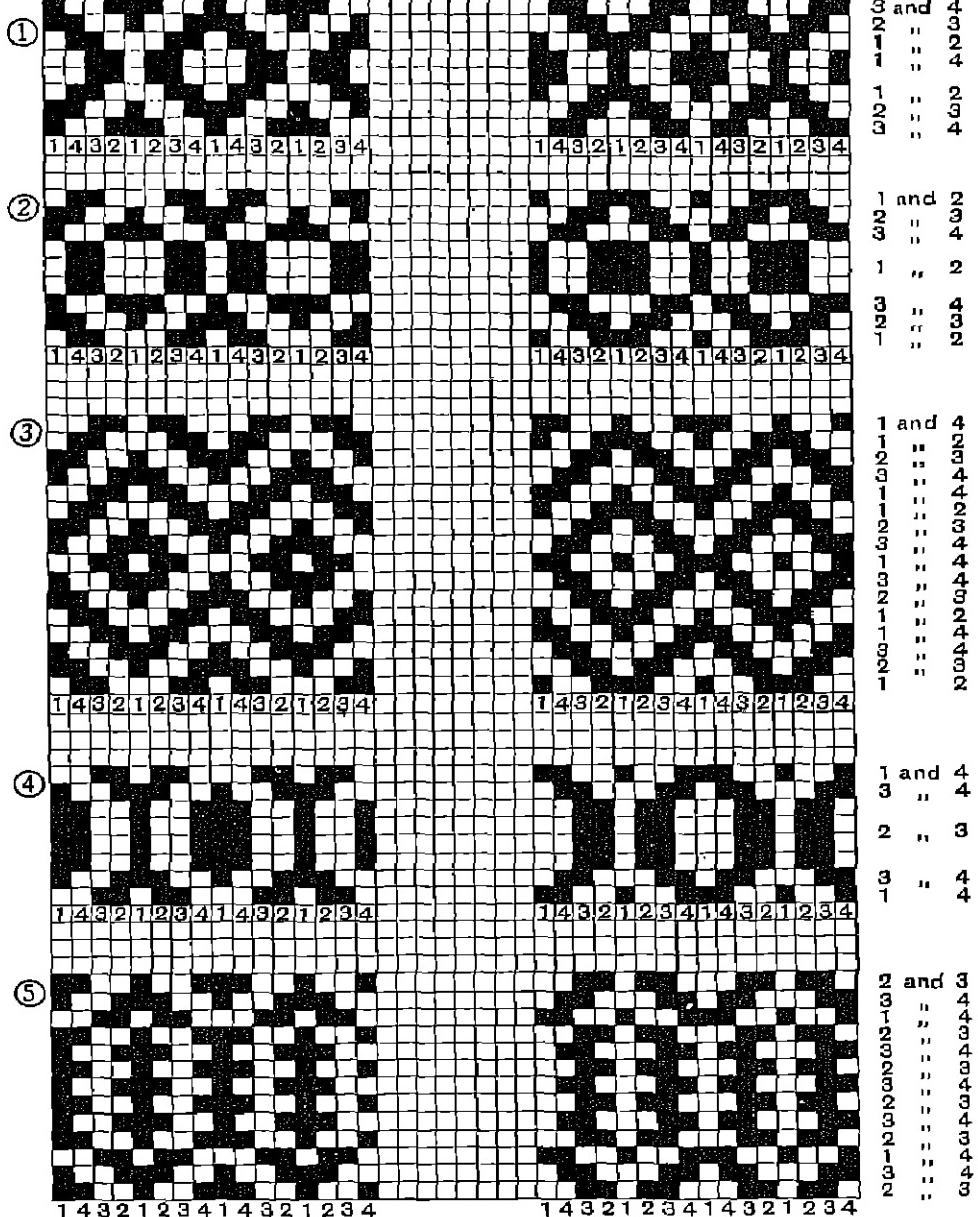


FIG. 29. BORDERS FROM "ROSEPATH" THREADING DRAFT

the children should write the figures for the pattern draft (for several repeats of the pattern) along one line of squares, reading the draft from right to left, the pattern being drafted above these figures. The heddles to be used for the first row of the pattern should be indicated at the right-hand side of the pattern draft as in Fig. 29. This means that if the first combination of heddles to be used is 1 and 2, then as all threads on these heddles will be raised all other threads will be left down and should be indicated by black squares on the pattern draft.

If the next combination of heddles is 1 and 4, then all threads on these heddles will be raised. The threads which are left down are now indicated on the second line of the draft. A draft taking one square to represent a thread in the warp and a horizontal line of squares to represent a line of weft will give only a general idea of the pattern. A truer conception of the pattern is gained if the actual number of rows to be woven on each heddle combination is indicated. This means that if four rows are to be worked

on heddle combination 1 and 2, then four rows of squares should be blocked in.

The small articles, Nos. 5 to 9 on Class Picture No. 129, were all woven on a four-heddle box loom and represent some of the first experiments in pattern weaving. This loom offers great scope for experiment and from it a weaver can grasp all the principles of any four-heddle table or foot power loom.

In the process of weaving warp strands may occasionally break. If this happens a new strand should be tied to the old one behind the heddles with a reef or weaver's knot. The strand should then be threaded through its correct heddle, passed through the reed and wound in the form of a figure eight round a pin which is fixed in the fabric in line with the warp strand. This end can be darned into the material when work is completed.

Strips of weaving done on a roller, box or board loom can be used for such things as iron holders, pincushions, needle cases, pochettes, small work bags, braids for trimmings, belts, etc.

V. MORE ADVANCED WEAVING

Table looms.—The table loom in Plate XXI has four heddles. On a loom of this type a girl can weave a piece of material and can produce the same patterns as on the more advanced four-heddle six-pedal loom at a later stage. The heddles in this case are made of wire and are fixed on four frames which move in grooves at the side of the loom. They can be removed while the warp is being wound on the loom. Strings are attached to the heddle frames and pass over small wooden pulleys, down to the side of the loom. Large wooden beads are attached to the ends of the string and in order to raise the heddles a string is pulled and slipped in a slit on the wooden projection at the side of the loom, the wooden

bead remaining under this, thus holding the heddle in place. As two heddles must be raised at a time for tabby weaving; i.e., either 1 and 3 or 2 and 4, this involves two separate movements, but having raised the two heddles and fixed the two wooden beads, the heddles remain in that position while the weft is inserted in the shed, and then the heddles are lowered. Plate XXII shows two children working at the Lawson table loom. This is a most practical four-heddle loom. It is easy to set up and does all that any four-heddle table loom, or four-heddle six-pedal foot power loom can do. It will take a warp 10 yds. long and weave material 23½ ins. wide. This loom is unique in that it is possible to work two heddles in one

movement—due to a special method of tying up the loom. This is a great saving in time and labour and it forms a valuable stepping stone to the principles of the foot power loom where two heddles are attached to one pedal and worked in one movement. This loom is most useful for school purposes as it will stand on a desk or table, a great asset; particularly when, owing to lack of floor space, it is impossible to have a foot power loom.

The pieces of fabric shown on the same Plate were woven by children on the Lawson loom.

Various methods of working the heddles have been adopted by manufacturers but the principle remains the same. In most table looms the heddles are raised but an occasional one is found whereby the heddles

are lowered by a lever attached to the side of the loom.

The weaving is done in precisely the same way. The children can still use the stick shuttle or can be introduced to the two types of shuttle shown on Plate XV which enable them to wind a longer amount of weft and to work more quickly. The roller shuttle is very easy to use as it slides quickly over the lower threads of the shed. At first children may find difficulty in using this type of shuttle as the two rollers slide over the warp strands so quickly and sometimes cause the shuttle to drop down between the warp threads. However, the children will overcome this difficulty with practice and will need to be familiar with this shuttle when they weave wider materials on either table or foot power looms. If the shuttle

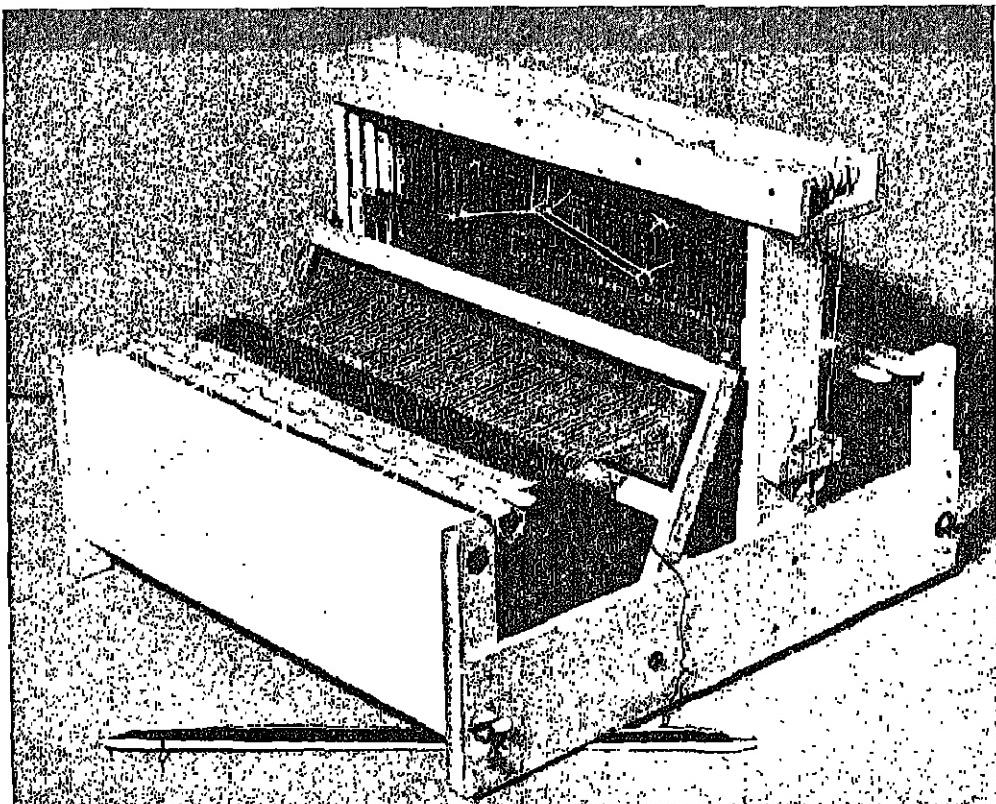


PLATE XXI. TABLE LOOM

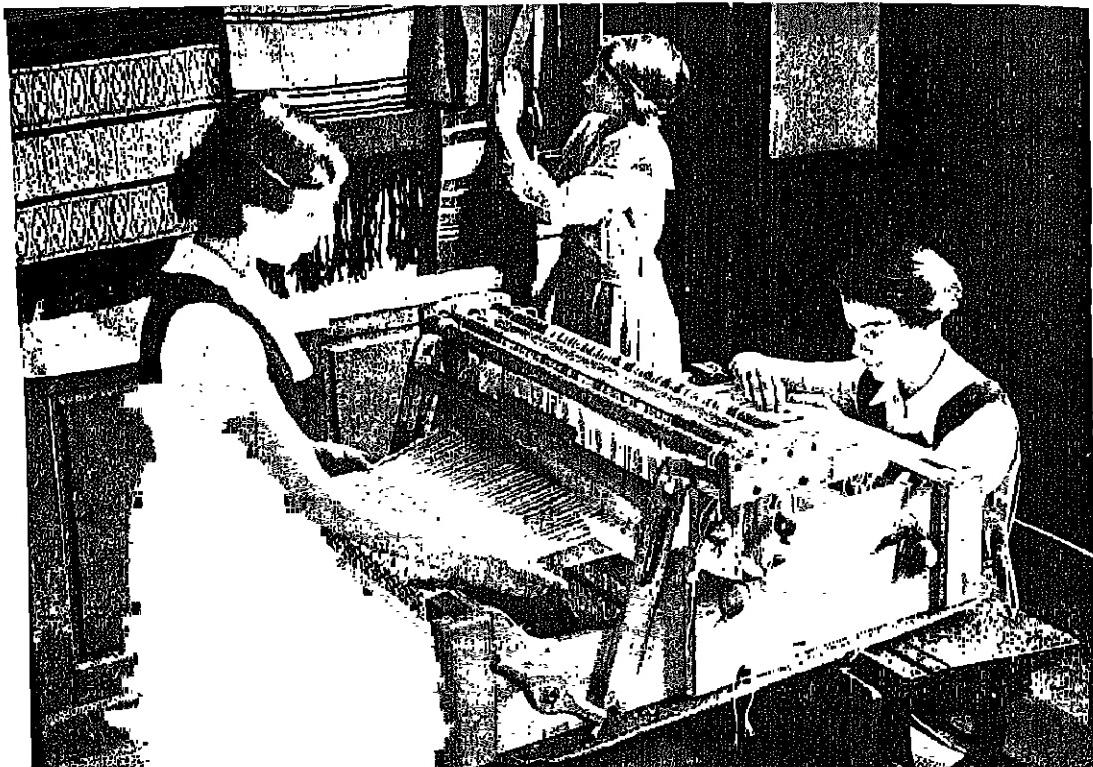


PLATE XXII. LAWSON TABLE LOOM

does drop through the warp strands and become entangled, the children will find it easier to cut the weft thread and start afresh than to thread the shuttle back into its correct position.

The history of the shuttle is most interesting and throughout the course children should experiment with various types. Various types of shuttles are shown with the primitive looms, Plates I to VII.

A bobbin winder is now necessary and can be bought from firms dealing in weaving materials. The winder can be screwed on to a table or desk. Care must be taken in winding bobbins as at first weavers are inclined to wind the wool too near the edges of the bobbin, when the wool is inclined to become loose, and is thus prevented from unwinding easily. A piece of fairly stiff paper should be cut a little shorter than the

length of the spindle or pin in the shuttle. The paper should be wound on to the spindle of the bobbin winder and an end of wool rolled into this. If the handle of the bobbin winder is now turned with the right hand and the wool guided with the left hand, an even bobbin can be wound (see bobbin in shuttle on Plate XV). It is best to wind a small quantity of wool at one end of the paper coil, and then the same amount at the other end. The wool can then be guided to and fro between these two raised ends, care being taken not to travel beyond them. The bobbin is now slipped from the winder on to the wire of the shuttle. The end of wool is threaded through the slot in the side of the shuttle so that it will unwind from the underside of the bobbin.

A small spring is fixed at one end of the shuttle. The pin is put into this end first

and then fixed in the hole at the other end of the shuttle, when it is ready for use.

Experiments should be made with some of the twill patterns and traditional threading drafts. Rosepath, honeysuckle, and monk's belt are perhaps the most useful for early work. The twill order of interlacing produces diagonal lines in the cloth.

Twills.—A great variety of twills can be woven; e.g., over two and under two threads; over three and under one; over two and under one. The loom should be threaded 1234. Heddles are raised in the following order:—1 and 2, 2 and 3, 3 and 4, 1 and 4. This can be repeated throughout or the twill can be reversed by raising heddles in the following order:—1 and 2, 2 and 3, 3 and 4, 1 and 4, 3 and 4, 2 and 3, 1 and 2. Some most interesting effects can be produced by the introduction of bands of colour in the weft, and by weaving several rows in twill pattern alternated with a few rows of tabby weaving.

In weaving twills it is sometimes found that the end selvedge thread is not caught in by the weft. If the threads are entered 1234 and the heddles used in the order 1 and 2, 2 and 3, 3 and 4, 1 and 4, the weaving should be so arranged that when using 1 and 2, and 3 and 4, the weft passes from left to right and from right to left when using the other heddles. If the children find that a selvedge thread is not caught by the weft they can either pass the weft round this or can break off the weft and pass two rows of weft from one side (though not of course through the same shed) and continue weaving as before.

Drafting patterns.—In drafting patterns on squared paper, the children will soon realise that the direction in which the weft thread passes must correspond to certain sheds, if the end selvedge thread is to be caught in each time.

The scarf, No. 3 on Class Picture No. 129, is the original adaptation of an American

pattern made by a girl of thirteen. Details of working are as follows:—

Threading draft 1234 (four blue and four white threads for whole warp). Three heddles are raised at a time as follows:—

43²

43¹

42¹

32¹

White weft is used for the scarf throughout with the exception of the border which is woven in blue and white check at each end. For the check border, the heddles are raised singly in the order 4321 and four rows of blue and four of white weft are inserted alternately. The upper and under surfaces of the weaving differ entirely but the fabric is full of interest and suggestion for other variations.

A great variety of weaving on various types of loom now becomes possible as the longer warp gives so much more scope. Weaving can be done in 3-ply and 2-ply wool and such things as scarves, runners, curtains, cushions, work bags, chair backs, nightdress cases, towels and fabrics for articles of clothing can be made. In the case of large articles, it may necessitate the joining together of various strips, which gives scope for decorative needlework.

Border patterns.—The weaving of articles with border patterns presents a new problem to the children. If a scarf is being woven with a pattern at each end, these two patterns must match, and if a curtain is being made from two widths of material with a border along the bottom, it is absolutely essential that the patterns in this case are an exact match.

When the first border has been woven it is gradually wound on to the roller or cloth beam and so becomes hidden from view, so some means must be adopted for keeping a record of the pattern rows. Some weavers write down in a notebook details of each pattern row as it is woven, and then repeat the same pattern when the second border is reached, but it is easy to make a slip in

copying this for the second border. From experience it is found that the texture of the fabric woven by one person varies from time to time, in the same way that variations in tension occur in knitting. This means that though the same number of rows of weft may be inserted at each end of a scarf, one pattern, when accurately measured, may be less or more in depth. The simplest way to overcome this difficulty is to fasten a strip of squared paper on to the scarf and on this rule lines showing the depth of each section of the plain and pattern weaving. Plate XXIII shows such a strip in use. As each pattern row is worked, a child can indicate in pencil the heddles used for this row, etc.

When the border is complete, the strip of paper can be used as a gauge for the other end. Before doing so, however, the lines indicating the depths of plain weaving and of the various borders should be clearly drawn in ink and the figures showing the number of rows and heddles used in each case should be clearly marked. The top of the pattern should be also indicated.

When the other end of the scarf is reached the first row of the pattern will be the same as the last row woven at the other end of the scarf; in other words the order of weaving the pattern rows will be reversed. In order to use the paper gauge satisfactorily, the paper must be reversed; the inked lines are continued across the full width of the paper and the figures indicating the number of rows and the heddles used (which are now upside down on the left side of the paper) should be written the correct way up to avoid the possibility of error, on the right-hand side. This gauge can now be attached to the weaving and the border continued. The depth of each section of the pattern must be adhered to in accordance with the lines on the gauge. This may mean that in some cases one or two extra pattern rows must be inserted. These will not be obvious in the finished article and will be far better than having borders at the two ends which differ in depth. This is particularly so in the

case of fabric which has to be joined accurately. As children become practised in the art of weaving, less discrepancies will naturally occur in the texture of the weaving.

Now that children are working with longer warps they will have to learn to calculate lengths of warp required, etc. As before stated, it is more economical to put a length of warp on a loom, sufficient for one or two articles. Though the same warp is used, a different weft can be chosen in each case so that the woven articles differ entirely in character; e.g., if a neutral grey warp is made, the same colour could be used for weft with the introduction of other colours; e.g., turquoise, green, orange, black, red, etc., for pattern in one case, and for the second article a dull green could be used for the weft and other shades of the same colour, with a touch of contrast, for the pattern.

To calculate the length of warp required.

1. Decide on the length of the article to be made; e.g., scarf $1\frac{1}{2}$ yd.

2. An extra 12 to 18 in. should be allowed for wastage, tying on front and back roller, etc. (If a warp is being made for three scarves this 12 in. wastage is sufficient for the three and illustrates the economy of the longer warp.)

3. Length required for three scarves is $4\frac{1}{2}$ yd. plus $\frac{1}{2}$ yd. = 5 yd.

The 12 in. mentioned as "wastage" need not necessarily be wasted. The ends, when cut off the loom, can be used for sewing up strips of weaving, for fringes, and for experimental weaving on a small card or board loom.

If, after making a number of warps, various oddments of wool are left over, these can be used up quite satisfactorily for a "blended warp" of mixed colours. This warp can be used with a weft in one or more colours and some most interesting fabrics can be produced from a weaver's oddments—thus lessening any cost on the original outlay for materials.

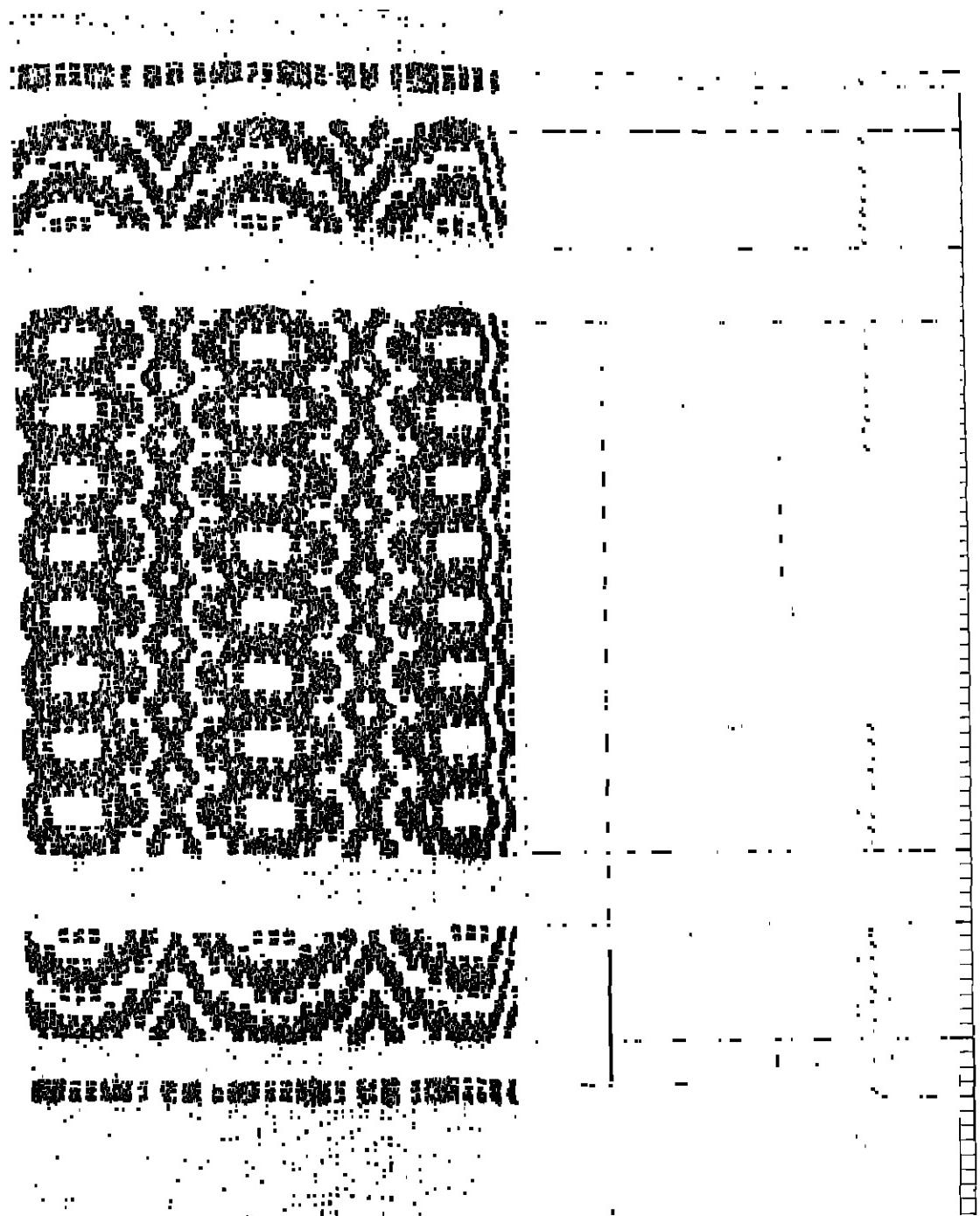


PLATE XXIII. HONEYSUCKLE BORDERS WITH PATTERN GAUGE
(2-ply warp: silk and wool weft.)

To decide number of threads required.—Multiply the width of article by the number of dents to the inch; e.g., a reed with 14 dents to the inch is used and a scarf 9 in. wide is woven; therefore, the number of threads required is 126. Extra threads should be added for the selvedge (2 or 3 double threads should be used for each selvedge).

<i>Warp.</i>	<i>Size of Reed.</i>
Wool for scarves.	12-14 dents to 1 in.
Wool tweed, etc., for dresses or coats.	14-16 dents to 1 in.
Coarse cotton, linen, for curtains, table runners, etc.	25-28 dents to 1 in.
Fine cotton for dresses.	28-32 dents to 1 in.

Materials for use.—

1. 4- or 3-ply wool for warp and weft. (The weft is often more loosely spun than the warp.)
2. Mercerised cotton for more advanced work.
3. Knitting cotton (8 threads to 1 in.) can be used for coarse curtains for bathrooms, etc.
4. Tweeds for dress materials.
5. Fine Egyptian cotton.
6. Silk.
7. Linen.

The question of texture of materials; i.e., number of threads to 1 in., may at first present difficulty, but this lessens with experience. The classbook of patterns of materials, etc., suggested in an earlier section will be of great service, as any errors in texture are easily discerned from a piece of woven fabric, and faults can be corrected in subsequent work.

An experimental warp can be set up on a board loom if desired and the correct number of threads per inch ascertained from this. A good piece of weaving should show equal quantities of warp and weft. A test for this is to hold the woven fabric up to the light when small squares of light should be obvious between the threads. The warp for tweeds and goose eye patterns can be

spaced more closely as in these cases the warp passes over small groups of threads. There are thus fewer intersections; and the weft can be beaten up more closely in consequence.

Traditional threading drafts.—Now that the children are able to use more complicated threading drafts, attention must be drawn to several points in connection with these.

1. The threading draft often indicates the order in which the heddles should be used, though adaptations of this are possible; e.g., honeysuckle threading draft (26 threads) (Fig. 30, No. 4) shows that the first section of the pattern is made by threads in heddles 1 and 4. The next section 1 and 2, 2 and 3, 3 and 4, and so on. The children should write out the draft reading always from right to left; e.g., 21/23/23/41/23/21/43/23/2121/414141 and mark off the various groups of threads. These numbers should then be used for the rows of weft; i.e., six rows of weft should be inserted using heddles 1 and 4, four rows using heddles 1 and 2 and so on. The pattern can be varied somewhat by adding more or less rows of weft for each pattern unit. Drafts should in all cases be made on squared paper beforehand.

2. After drafting a pattern from one or two repeats of the threading draft, the children will see that the resulting pattern is not balanced at both edges. Though this is no drawback in a piece of fabric with an all-over pattern, it is not altogether satisfactory for a scarf, etc. Children will realise that in order for both edges of the pattern to balance, each side must work from a central point. By looking at the draft the children will see that if the pattern is threaded from the tenth to the twenty-fourth thread (inclusive) or from the eighth to the end of the draft, a balanced pattern is given in each case. From experiment they will realise that by threading the 26 threads of the draft and an additional 7 threads, the pattern will also be balanced and will work from the centre thread which in this case is 3. 141414/1212/323412/3/214323/2121/414141.

After experimenting with this pattern draft the children will be able to analyse any pattern draft in the same way and be able to weave a balanced pattern when desired.

The monk's belt threading draft (Fig. 30, No. 6) requires 6 extra threads to give a balanced pattern. This draft is useful for large articles and makes interesting borders.

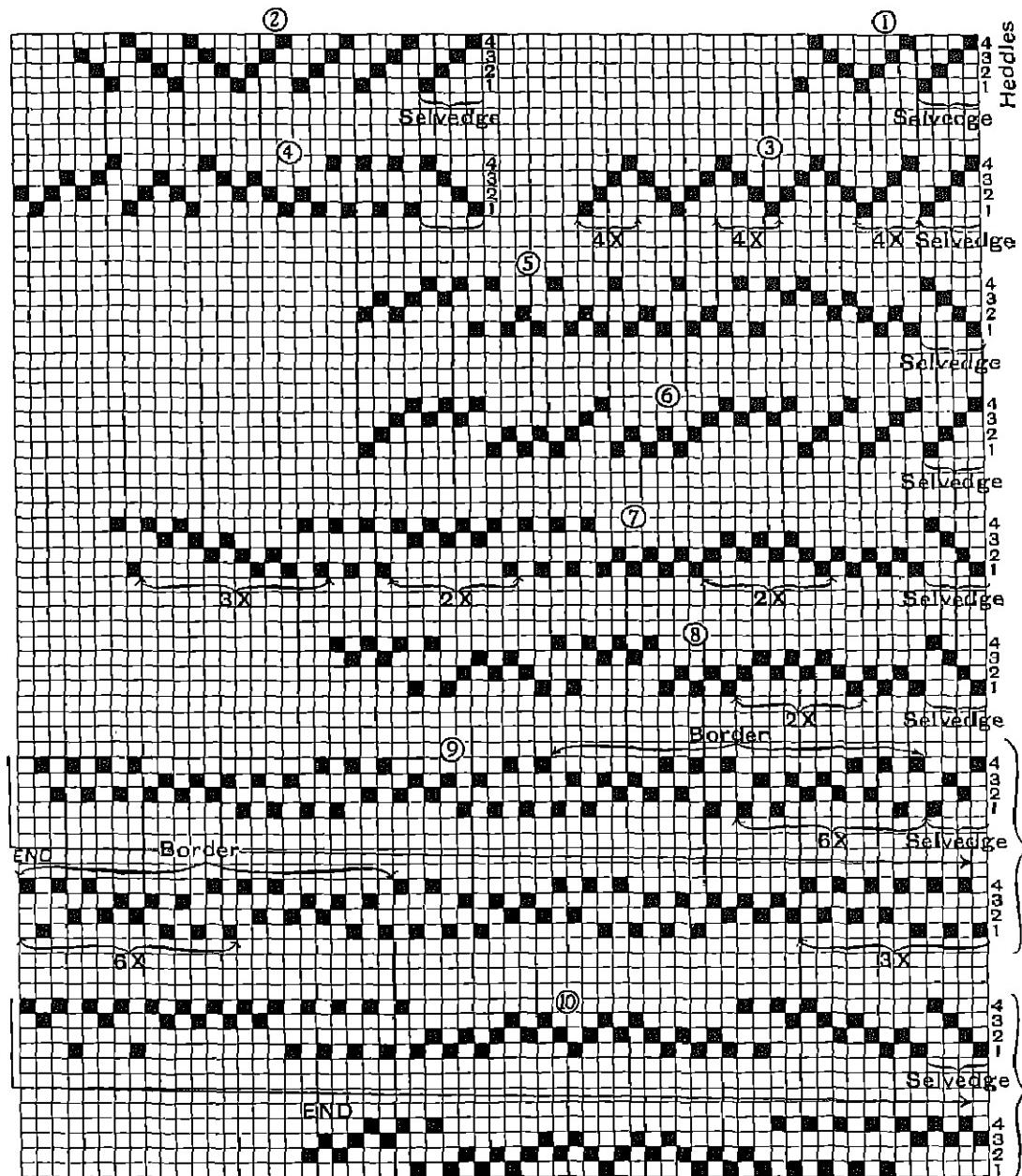


FIG. 30. THREADING DRAFTS

for curtains, etc. It would be suitable for coarse curtains for bungalow, kitchen or bathroom, in cream knitting cotton with borders of bright colours.

If extra threads are added to any threading draft it may necessitate the adjustment of the selvedge threads at the left-hand side of the loom; i.e., if the last pattern thread is 1 in., then the first selvedge thread must not pass through 1 in. or two threads will be raised together and thus upset the order of the tabby weaving. The first selvedge thread in this case should pass through heddle No. 4.

Details of the threading drafts on Fig. 30 will now be given. These drafts should be sufficient for all school needs, but if a teacher requires more advanced drafts she should refer to the books mentioned in the bibliography. Access to these can usually be had at any good reference library.

Threading drafts—No. 1 Rosepath threading draft (8 threads).—This is one of the most useful threading drafts, particularly for school purposes, and consisting of only 8 threads it is easy for children to remember. A delightful range of small borders and some interesting all-over patterns can be produced from this draft.

No. 2. Goose-eye (22 threads).—This is suitable for an all-over pattern for linen, fine wool materials and tweeds. No binder is used for this pattern. A foot power loom should be tied up as follows for this pattern:—

Heddles.	Pedals.
1 and 2	1
2 and 3	2
3 and 4	3
1 and 4	4

No. 3. Goose-eye adaptation (58 threads).—A useful pattern for serviettes, tea cloths, etc. The loom should be tied up as for goose-eye pattern.

An interesting all-over fabric can be woven if the pedads are used in the following order:—

4321	four times
2343	
2123	
4123	three times
432123	

No. 4. Honeysuckle.—A delightful pattern for most purposes. A great variety of borders and some good all-over patterns can be woven from this threading draft.

No. 5. Butternut.—This gives an interesting pattern for cushions, curtains, etc. The cushion No. 12 on Class Picture No. 129, was woven from this draft.

No. 6. Monk's belt.—Useful for bold borders for curtains and other large articles. Unsuitable for smaller articles.

No. 7. Snail trail.—This threading draft can be used for the treadling draft and an interesting pattern results.

No. 8. Cleveland web.—A useful pattern for larger articles. If used for cushions an interesting border can be added by repeating the selvedge threads six or more times at the beginning and reversing the order of these for the second selvedge.

No. 9. Orange peel.—The cushion, No. 13 on Class Picture No. 129, was woven from this draft. It is a useful pattern for heavy fabrics, covers and curtains. If a narrower border at the side is required one or more of the repeats, shown in brackets, should be omitted.

An unusual method of tying up the loom is indicated:—

Heddles.	Pedals.
2 and 4	1
2 and 3	2
1 and 2	plain
3 and 4	3
1 and 3	4
1 and 4	5
	6

No. 10. Whig rose.—A delightful range of patterns can be woven from this draft. As there are so many threads in the draft, it should be given only to children who have had plenty of experience in threading up and weaving from the simpler drafts.

When threading up a loom to any "draft," the children should write out the draft and

pin on the loom—one copy at the front of the loom and one at the back—in such a position that each of the two children working together on the loom can see it easily and so check each other and ensure that the "entering" is correct.

VI. FOOT POWER LOOMS

WE now reach another stage in the history of weaving—the introduction of foot power. Up to this stage leashes and heddles have been manipulated entirely by hand, and the children following along the lines of their ancestors may think of ways by which relief can be obtained for the hands, and use their feet for some of the work. Plate VI shows an interesting model of a primitive tripod loom in which roughly constructed pedals are used for working the heddles. On the other hand Plate XXIV shows a roughly constructed loom to fulfil the same purpose. Both of these looms have two heddles only for tabby weaving, but the same idea can be developed later for pattern weaving.

Structure of foot power looms.—The loom on Plate XXIV is roughly constructed from a sugar box and has two rollers made from a broom handle; heddle frames and pedals made from strips of wood; heddles from fine string, and a clamp (shown on the side of the loom) for fixing the rollers. This clamp can also be used for holding the small heddles rigid while entering the threads

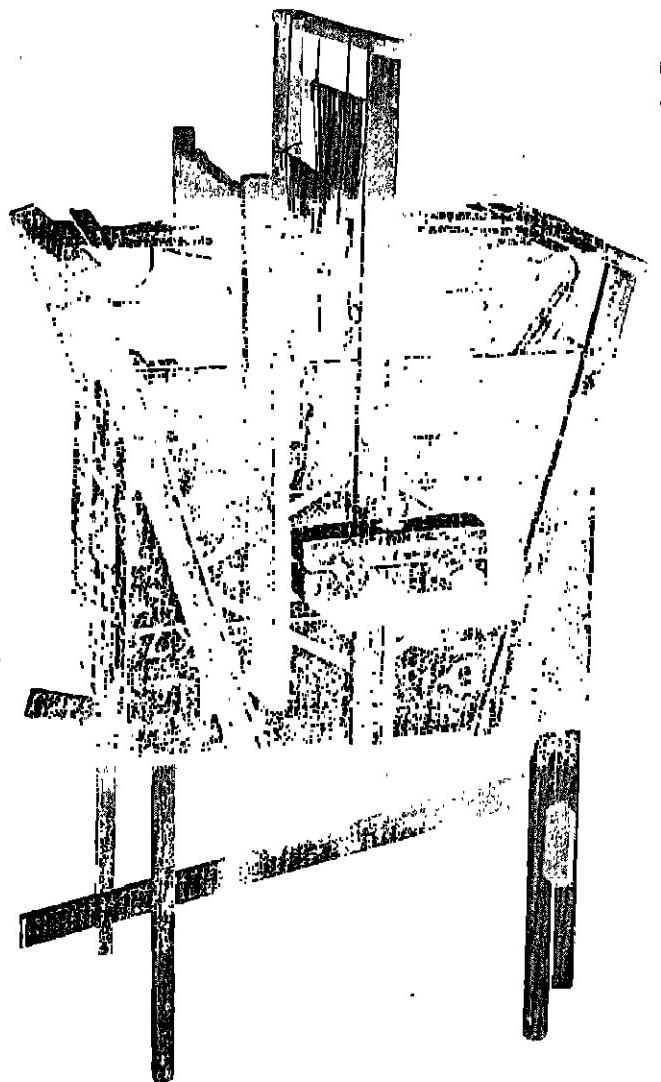


PLATE XXIV. HOME-MADE TWO-PEDAL LOOM

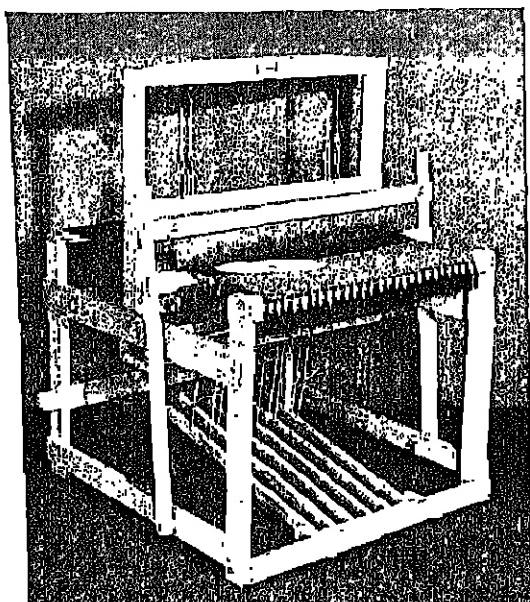


PLATE XXV. FOOT POWER LOOM

(see Fig. 16). The two heddle frames are attached at the top by a string which passes over the top beam, the string moving easily in a groove.

The heddle frames are again attached to the pedals by string and a non-slip loop, Fig. 31. As each pedal is pressed down the heddle to which it is attached also moves down, and the other heddle moves up a corresponding amount, thus giving a good shed.

Though this loom is made so simply, attention has been paid to the surfaces over which the wool warp or woven fabric passes, these being very well sandpapered to prevent friction. Some delightful work has been done by children on this loom and it forms a good introduction to the principles of a foot power loom.

Many hand looms (which are better termed foot power looms) are on the market and though they differ in minor points the general principles of structure remain the same. Hand looms are supplied with four heddles and a reed similar to those found on table looms, but have the addition of

four or six pedals. Though in some cases the heddles are tied direct to the pedals as in the home-made loom described above, in others they are tied to "lams" and the lams to the pedals. Threads are now pulled down by pressing a pedal, whereas formerly on table looms they were raised.

In the loom on Plate XXV two grooved pulleys (similar to those used on a clothes drier which hangs from the ceiling) are screwed into the top beam. A string passes over the pulley and each end is attached to the eyelet on another pulley. The two smaller pulleys at each side of the loom support two heddle frames by a string which is attached to the first heddle frame, passed over the pulley and then fastened to the second frame. Two small pieces of wood or heddle horses (see Fig. 32) can be used instead of the pulleys for supporting the heddles.

The heddles are next tied in order to the lams (the provision of lams simplifies the tying up and enables a weaver to get a more direct pull on the heddles). The lams are fixed on a bar at one side of the loom. Each lam has a hole in line with the centre of the heddle frame. A string is passed through this and attached to a special non-slip loop (Fig. 31) fixed to each heddle. This loop is easy to manipulate and enables the height of the heddle frames to be adjusted easily.

In addition, each of the four lams has a series of holes in line with the pedals; strings pass through these holes and are tied to a loop fixed in each pedal. As each lam is

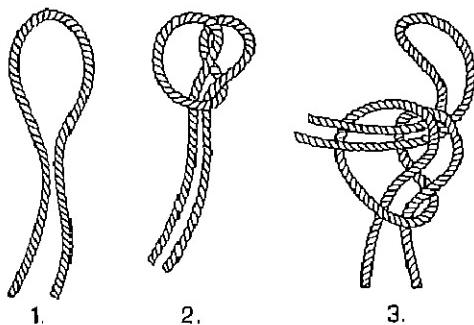


FIG. 31. NON-SLIP LOOP

tied directly to each heddle it will be seen that if a lam is pulled down the corresponding heddle is pulled down. If the lams are tied to the pedals, it gives the same result as tying the heddles to pedals.

Great care must be taken with the tying up of the loom as good weaving can be done only on a well-fitted and perfectly balanced

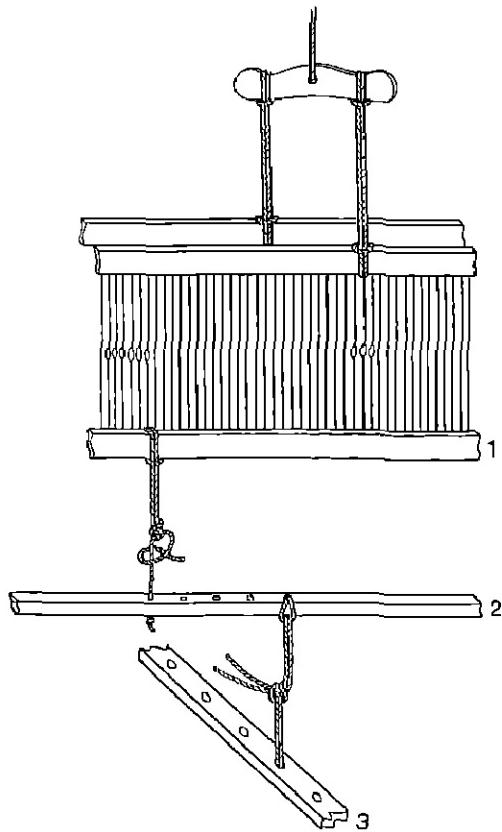


FIG. 32. METHOD OF TYING UP LOOM

1. Heddle. 2. Lam. 3. Pedal.

loom, and time devoted to this part of the work is well spent. Good strong jute string should be used for tying up the loom as it is less likely to stretch. The pedals have a series of holes along their length which line up vertically with the holes in the lams. Strings pass through the holes and are joined to the lams in accordance with the pattern to be woven.

Pedals are numbered 1 to 6 from right to

left of the loom. The two middle pedals are used for the plain weaving and the other four for pattern. The method of tying up varies but the usual one is as follows:—

Pedal 1 to lams 2 and 3	}
" 2 to lams 1 and 4	
" 3 to lams 1 and 3	
" 4 to lams 2 and 4	
" 5 to lams 1 and 2	

" 6 to lams 3 and 4

It makes no difference which heddles are tied to each pedal but the above is the usual method for most patterns. Children must, however, keep a record of the "tying up" and check this with any pattern they may be using. If they tie heddles 2 and 3 to No. 1 pedal and they are working from a draft in which heddles 1 and 2 are tied to No. 1, they must alter their order of using the pedals in accordance with this. In addition they must notice which heddles are used for the tabby weaving. Though 1 and 3 and 2 and 4 are generally used, some threading drafts; e.g., orange peel (Fig. 30, No. 9) gives heddles 3 and 4 and 1 and 2 for the tabby weave, as can be seen from the threading draft. In this case the loom would have to be tied as indicated by the threading draft.

The tying up of the loom cannot be begun until the warp has been fixed on the loom. The making of the warp is the same as for the other type of loom, but the transferring of this to the loom varies somewhat for the hand loom.

The warp should be spread out across the width of the reed, two double threads through every fourth dent as before (the reed being removed from its frame for the purpose). The heddles should be detached from the lams and then raised and tied temporarily to the top of the loom, thus giving an open space for the warp. The reed with the warp threads spaced evenly should again be fixed in the frame or batten with the chain of warp at the front of the loom, and the loops on a shed stick, towards the back of the loom. The shed stick is attached to the roller or warp beam, the cross transferred to the

back of the loom and the warp wound on the roller as before.

When all the warp has been wound on, the shed sticks tied to the warp beam and the threads tied in small bunches, all is ready for the "entering."

The heddle frames are released and put in position. One girl sits at the back of the loom and sorts out the threads in turn, passes them through the correct heddle and they are then drawn through a dent of the reed by a girl at the front of the loom.

The selvedge threads at the right of the loom (looking from the front) are entered first, one through each heddle, two through each dent of the reed. Then the threads of the pattern are entered, one through each heddle and one through each dent of the reed. As each set of threads forming a pattern; e.g., the honeysuckle with 26 threads, is completed, it should be tied in a half bow at the front of the reed, and carefully checked before proceeding with the next pattern.

If a mistake occurs in the entering it produces a flaw in the weaving and may necessitate rethreading the warp. When all threads are entered and the warp ends attached to the front roller, the loom is ready for tying up.

The height of the heddle frames should be adjusted, the eyes of the heddles should be in line with the centre of the reed, when this is standing vertical.

The heddle frames should now be tied firmly together, the strings fixed on the bottom of the heddle frames and tied carefully and securely to the lams. The lams should be almost parallel with the heddle frames, having a slightly upward tilt. They should be tied together temporarily while they are attached to the pedals. The pedals should hang evenly at the same height from the floor. If they are too high they will impede the movement of the lams and be trying for the weaver. The temporary strings tying the lams and the heddles together are now removed and the tension

of the warp is next tested. It should be taut and springy to the touch. By pressing pedals 3 and 4 in turn the tabby weave can be tested; i.e., one set of alternate strands should be pulled down in each case. If this is correct, the ends of the warp can be tied more securely. A stick is inserted in one shed and the weaving begins.

The children will quickly see that whereas in the table loom two movements were necessary to manipulate two heddles, in the foot power loom only one movement becomes necessary as two heddles are tied to each pedal.

The children can now work the pedals, using the right foot for the pedals at the right and the left foot for the pedals at the left. For tabby weaving, using the two centre pedals only, one foot can be used, transferring it from one pedal to the other as required.

Experience will show that if the shed is kept open while the weft is beaten up, it will be beaten up much more closely. It is advisable to close the shed for beating up a loosely woven woollen fabric, but keep it open for beating up a closely woven cotton fabric.

Fabrics.—Children can now weave wider pieces of fabric but should not attempt a piece in a width greater than the distance they can extend the arm for throwing the shuttle. Material 24 to 27 in. wide should be attempted first, later material up to 36 in. can be woven.

Fabrics for the following types of articles can be woven:—

1. Dresses, in wool, tweed, linen, cotton, etc.

2. Coats, skirts, hats, in wool, tweed or linen.

3. Overalls, aprons, etc., in Egyptian cotton, mercerised cotton, knitting cotton, linen, etc.

4. Curtains in wool, cotton, cotton warp with wool weft, mercerised cotton, knitting cotton, linen, cotton warp with linen weft, camel hair, etc.

5. Tablecloths, serviettes, towels, duchesse sets, runners, chairbacks, bags, etc., in fine cotton, cotton warp with linen weft, linen warp and weft, mercerised cotton, etc.

6. Workbags, handbags, pochettes in wool, tweed, linen, etc.

7. Scarves in machine- and hand-spun wool, wool warp with silk weft, etc.

To calculate the length of warp required for a foot power loom.—

1. Decide on length of material; e.g., 4 yd. long.

2. Add 4 to 6 in. for every yard, for shrinkage when the material is pressed and shrunk.

3. Add $\frac{3}{4}$ yd. for wastage and tying on the loom.

4. Length of warp should be 4 yd. plus 24 in. plus 27 in., which amounts to 5 yd. 15 in.

5. Allow 4 in. in width for shrinkage.

Various materials can be used on a hand loom; e.g., 2-ply wool, 3-ply wool, Egyptian cotton, mercerised cotton, knitting cotton, linen, tweed yarn, etc. Tweeds can be woven most successfully by senior girls on a foot power loom. Good Cheviot or Harris yarn can be bought in varying thicknesses and is suitable for weaving 12, 14 or 16 threads to the inch. The yarn is generally woven in the greasy state, being scoured and finished later.

To scour.—The fabric should first be soaked in hot water and left to cool. This loosens all dirt. The cloth is removed from the bath and the water squeezed out. It is then inserted in a bath of hot well-lathered water and moved about in this. Several baths of lathered solution may be necessary to remove all grease and dirt. (Primitive people often use their feet for pounding the dirt out of the cloth.) There must always be sufficient water to cover the cloth. When the cloth is clean it should be immersed in warm water to remove every trace of soap, which is most important. The water in the last bath should be quite clear. The cloth should next be hung to dry in the open air, if possible. If desired, the fabric can be sent

to one of the many firms of cloth shrinkers to be "finished" professionally for a very small charge. (The writer has often had a length of cloth 6 to 8 yd. long and 36 in. wide scoured and finished for the modest sum of 1s. 6d.). Many firms are to be found in London and some of the northern cloth manufacturing towns.

In weaving tweeds, trouble may be experienced with the selvedge threads, as some of the tweed yarn is rather loosely spun, and the threads often break. This difficulty can be overcome by inserting at the selvedge firmer and more tightly spun wool of any colour, this portion of the fabric being rarely used when making up. Tweeds can be made in tabby weave or in twills or a combination of both. Good fabrics can be produced by weaving with tweed yarn on a machine spun 2-ply wool weft.

Tie up for twill.

<i>Pedals.</i>	<i>Heddles.</i>
1	1 and 2
2	2 and 3
3	3 and 4
4	1 and 4

Pedals used in the order 1, 2, 3, 4, etc.; only four pedals are necessary.

Tie up for plain weave and twill (combined).

<i>Pedals.</i>	<i>Heddles.</i>
1	1 and 2
2	2 and 3
3	1 and 3 } plain
4	2 and 4 }
5	3 and 4
6	1 and 4

Some most interesting effects can be produced by colour and weave stripe patterns, some suggestions for which are now given.

1. Threading order:—

2 dark, 2 light for 1st stripe } 8 or 12
 2 light, 2 dark for 2nd " } threads to
 2 dark, 2 light for 3rd " } a stripe.

2. 2 and 2 hopsack same colouring in warp and weft.

3. 2 dark, 2 light, 4 dark, 4 light in warp and weft hopsack.

4. Twills. 4 dark, 4 light reversed at intervals.

5. 2 and 2 in warp, 1 and 1 in weft.

6. 2 and 2 colouring in warp, 4 and 4 in weft.

7. 3 and 3 in warp, one colour for weft.

8. 3 and 3 in warp. Same for weft.

9. One colour warp. 3 and 3 weft.

By the time the children reach this stage, they should have an interesting book of threading drafts with details of tying up the loom, reed used, etc. They should be encouraged to experiment with original adaptations of traditional threading drafts, and to make simple threading drafts of their own. In writing original drafts the children must keep the following points in mind:—

1. Too many adjacent threads must not be drawn down together or too large a block of colour will result (6 to 8 threads should be the maximum).

2. The tabby weave must remain undisturbed throughout the draft; i.e., one set of

alternate threads must be on either heddle No. 1 or No. 3, the other set on either No. 2 or No. 4.

A great variety of fabrics can be woven on a hand loom. Plate XXVI shows a motor rug woven by girls of thirteen on this type of loom. The warp is made of single ply beige rug wool, 6 threads to the inch, and the weft (green and beige) is spun and dyed by the children. The ends of the warp are knotted to form a fringe and the rug is delightfully soft and warm. This type of rug offers great scope for using hand-spun wool, which at first is rather on the coarse side. Another rug was woven by the same class of girls. This was made on a blue 2-ply wool warp (3 strands of the wool forming one warp strand), the weft being hand-spun and dyed blue, with orange borders. These rugs are similar to the camel rugs woven by the Bedouins in Morocco, and they make delightful door curtains or "throw-overs" for a settle.



PLATE XXVI. MOTOR RUG

Curtains offer great scope. They can be woven in fine cotton, mercerised cotton, linen, wool (cotton warp, wool weft), etc. Attractive net curtains can be produced by using a fine cream cotton warp (14 threads to the inch) and the same thread for weft which is beaten up loosely. Attractive borders in coloured mercerised cotton can be added at intervals. A strong selvedge (at least 16 threads, 2 being taken through each dent) should be allowed for this type of curtain.

Pleasing effects are obtained by missing some of the dents in the reed and the same number in the weft, giving a loose open effect, or by putting a group through the same heddle at intervals and inserting the same number of rows of weft in one shed. The large raffia bag on Plate XXVII illustrates the latter idea which results in a large check pattern. Though the three bags included in this Plate are made in raffia they form interesting patterns for any hand-

woven materials. The fastening in each case is of particular interest. Strip Linson which is now on the market in varying widths from $\frac{3}{8}$ in. wide would be most suitable for bags of this type. The material is strong and serviceable and is supplied in a wide range of attractive colours.

Rug weaving.—The hand loom offers great scope for rug weaving. Rugs made in this way are quickly produced and can be most attractive. Unless the loom is very sturdy, however, rugs of too great a width should not be attempted. The warp is made in the same way as described for wool, a 4-ply wool, cotton or string carpet warp and a single ply, a 3- or 4-ply rug wool for weft.

Only two heddles are necessary for tabby weaving, but if the loom is equipped with four heddles the warp should be entered 1, 2, 3, 4, repeat. Heddles 1 and 3 are tied

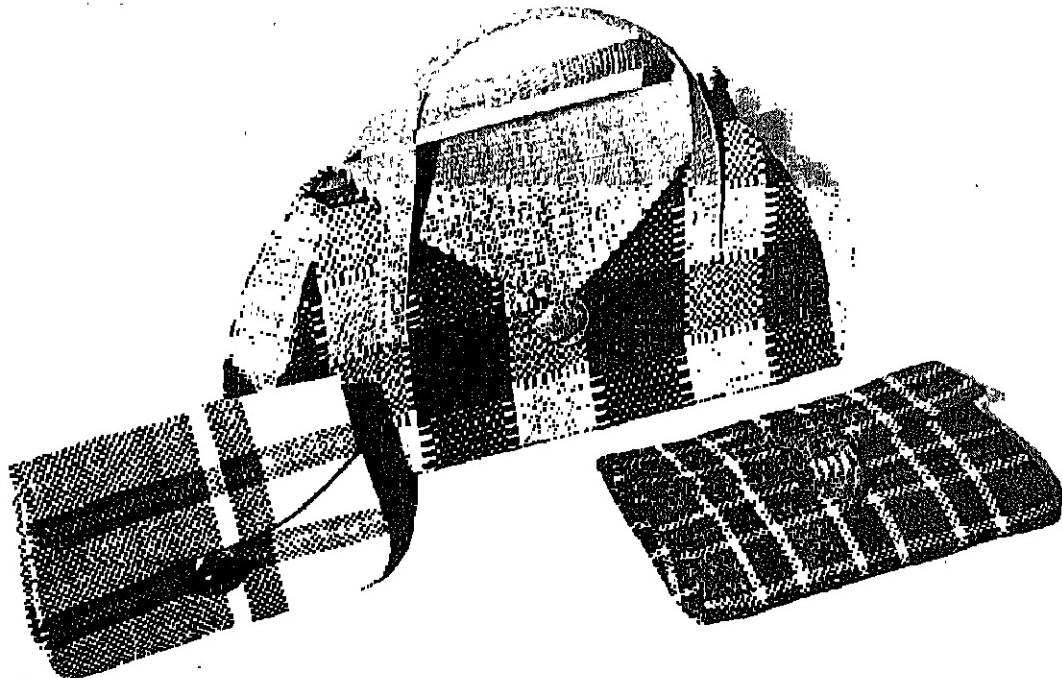


PLATE XXVII. RAFFIA WEAVING

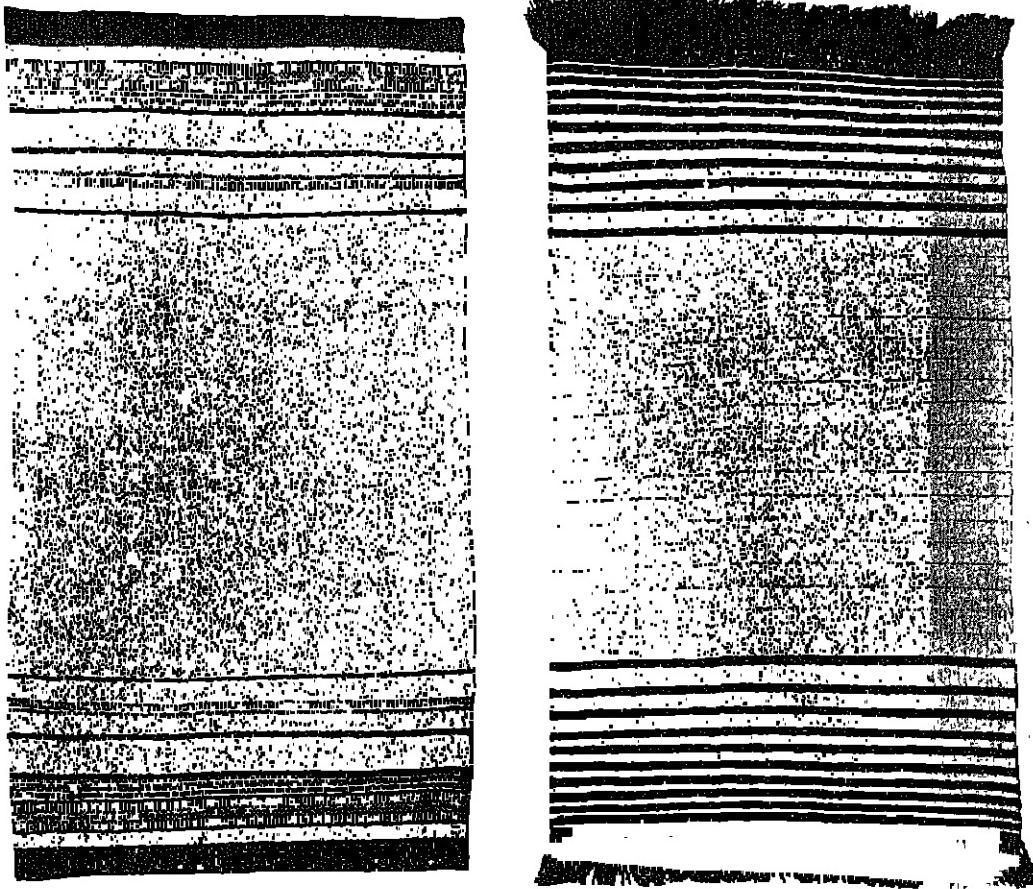


PLATE XXVIII. HAND-WOVEN RUGS

to one pedal, 2 and 4 to the other. The two middle pedals should be used for convenience, the others being detached from the lams, etc.

It will be obvious that as in this type of rug all the warp strands must be covered, no pattern rows which involve the passing over groups of threads can be included. Some good effects can be obtained by using two colours alternately. This means that one colour will appear on the odd numbers in the warp, the other on the even numbers, giving vertical stripes of colour.

Horizontal stripes are produced by several rows of tabby weaving in one colour. Plate

XXVIII shows two rugs woven on this type of loom. Tapestry designs can also be included.

Pile rugs offer much more scope for variety in pattern. The threading is still the same, each thread passing through one dent of the reed (12 dents to the inch) except at the selvedge when two threads pass through each dent. Three or four double threads should be allowed for the selvedge. A few inches of weaving should be done at each end, using the same yarn as for the warp.

A row of knots (previously described) cut from wool $1\frac{1}{2}$ to 2 in. long is now made on each pair of warp strands with the

exception of the selvedge threads, which should be treated in the way suggested for small rugs in Section III. (There will be six knots to the inch.) This is followed by two rows of tabby weaving which are beaten up closely each time. The colour of the pile can be changed at will, in accordance with a previously drafted pattern.

Some attractive rugs suitable for bungalows and other small homes can be made using flax string for warp and a combination of string and natural rush for weft. Others are made with string for warp and chenille, dyed tape or coloured rags, cut in strips $\frac{3}{4}$ to 1 in. wide for weft.

Plate XXIX shows an upright rug loom fitted with two heddles, reed and two pedals, a warp and a cloth beam. This is a very sturdy and useful loom for school purposes, and is a great advance on the simple home-made rug looms used previously.

Plate XXX shows children working at a hand loom; Plate XXXI a Scotch weaver at his loom; Plate XXXII a weaver "tying on" a new length of warp. This method of "tying on" a new warp to a short length of an old warp saves much time in threading up to a detailed threading draft. The warp is made as usual and each end of the new warp is tied in its correct order to an end of the old warp (in front of the heddles). Care must be taken, however, in winding the warp on to the warp beam, to avoid breaking the knots.

This method is adopted in the factories to-day but instead of being "tied on" the threads are "twisted in"—the twisting process being aided by dipping the fingers in some special preparation.

Spinning with a wheel.—After plenty of practice in spinning wool with a spindle, the children should be introduced to the spinning wheel, an invention of the sixteenth century.

A spinning wheel not only provides a quicker method of spinning wool, but offers a delightfully restful occupation. As a worker sits at the wheel in a comfortable position with her foot on the pedal, working in easy rhythmical movements, listening to the scarcely audible purr of the revolving wheel, she can almost create for herself some of the soft melodies provided by her ancestors.

The spinning wheel is a development of the principle of the spindle. The spindle of the wheel is a metal rod fitted into leather sockets, supported on a framework, Plate XXXIII. One end of the rod is hollow with an opening, A, through which the wool passes and comes out at B. This spindle rod has a fixed horseshoe-shaped wooden attachment or flier, E, with a series of hooks on opposite sides of each arm. These hooks are used to guide the spun wool on to the bobbin, F, during the spinning process. The wool is moved from hook to hook in order to produce an evenly wound bobbin.

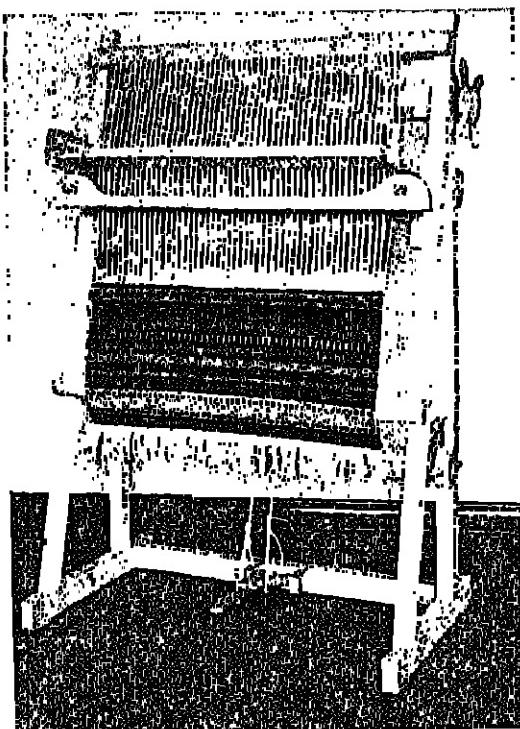


PLATE XXIX. FOOT POWER RUG LOOM

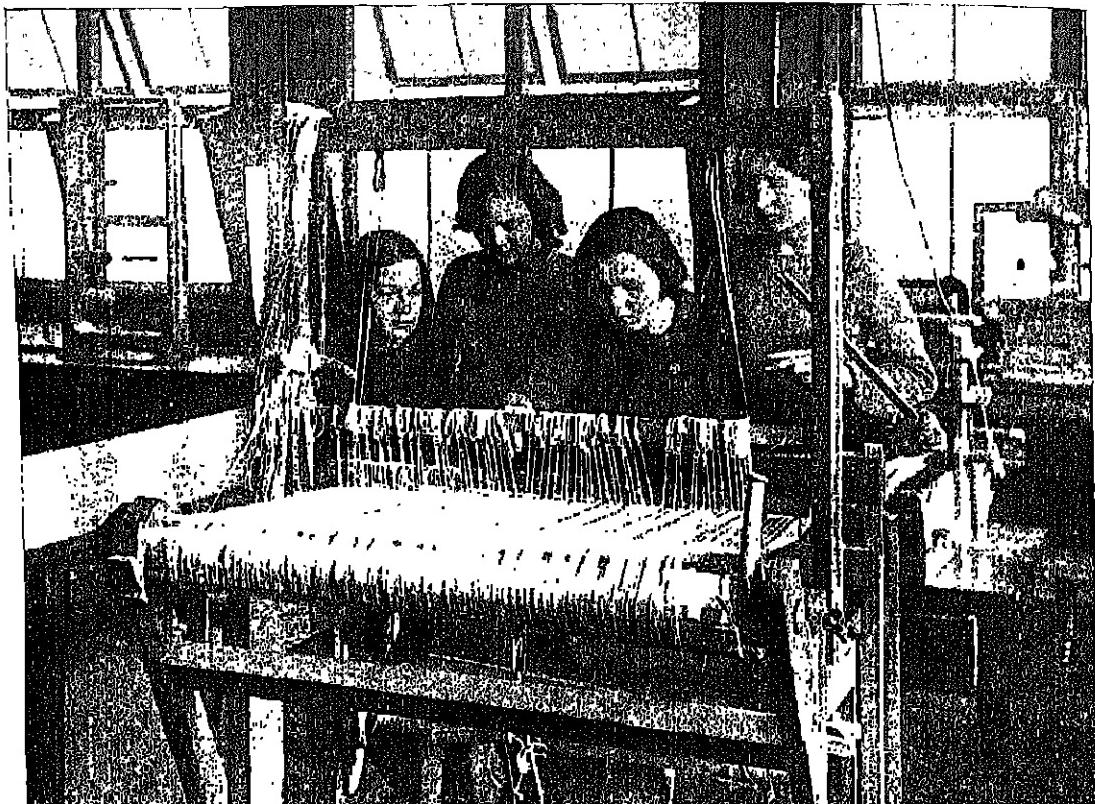


PLATE XXX. CHILDREN AT HAND LOOM

A bobbin, F, having a grooved pulley, C, at one end, is fixed on the spindle. The bobbin rotates freely on this spindle, and should be placed so that the pulley, C, is in line with the large driving wheel. Another pulley, D, with two grooves of varying diameters is fixed to the centre spindle adjacent to the pulley on the bobbin, so that it rotates at the same speed as the spindle and fliers. The endless driving string connects (1) the bobbin and pulley, C, and (2) the spindle pulley, D, to the large driving wheel. Plate XXXIV shows a child working at a spinning wheel.

Method of making the driving band.—Take a piece of strongly twisted string, hold one end in the left hand, pass the other end over and round the driving wheel, under the fixed spindle pulley, D, over the driving

wheel again and under the bobbin pulley, C. Pull the two ends of string tightly and overlap them for about $1\frac{1}{2}$ in. The two ends should then be stitched neatly together with a needle and thread.

Most spinning wheels have an attachment for adjusting the driving belt. Before making the belt, adjustment should be made so that the frame work supporting the spindle is as near the driving wheel as possible. This will enable the driving belt to be tightened as it stretches during the spinning process. The spindle pulley has two grooves of different diameters. When beginning work the driving belt should be in the groove with the largest diameter. As the bobbin fills up and increases in diameter, the driving belt should be changed over to the groove with the smaller diameter, so that the speed

of the spindle is increased in proportion to the increased diameter of the bobbin. From practical experience it is found that the position of the driving belt on the large pulley can, however, be maintained throughout for spinning wool, but the smaller pulley may be found more suitable for cotton, silk and linen which are more tightly spun.

Spinning can now begin. Take a length of machine-spun wool (about 2 ft. in length), tie this on to the bobbin and wrap it round a few times. Carry it along the hooks on the flier, thread it through hole B and out at A. A thin hairpin or twisted wire is useful for threading the wool through the hole in the spindle. If the wool is held tightly with the fingers and the wheel rotated by working

the pedal, the wool is twisted by the rotation of the spindle. If the hold on the wool is slackened it automatically winds on the bobbin.

The children should understand the working principles of the wheel, which are very simple. Students were once spinning with spindle and spinning wheels in the environs of an engineering college. Some workmen were most interested in this work, particularly in the principle of the spinning wheel—a very old principle which is apparently still adopted in many of the modern machines (that of differential speeds).

The children should have a few minutes' practice with pedalling and in controlling the stopping of the movement. The wheel should be stopped when the pedal is at its

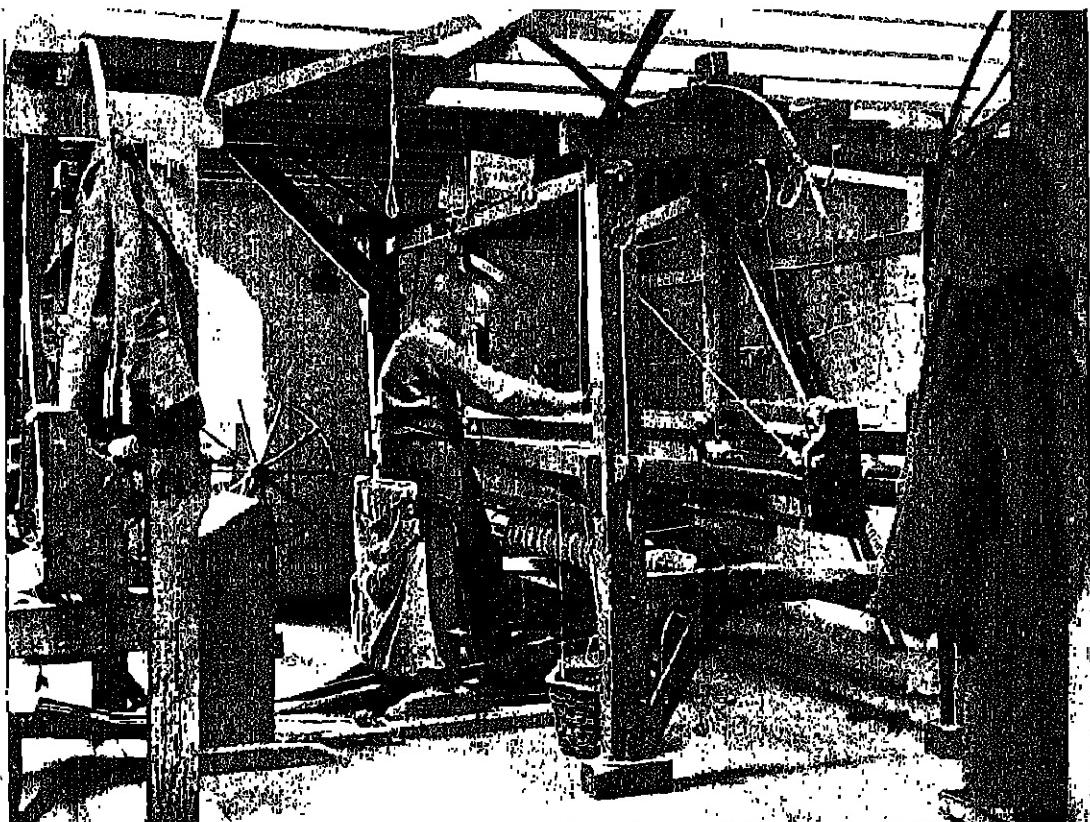


PLATE XXXI. SCOTCH WEAVER AT WORK

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highest point, then when work is restarted the wheel will start revolving clockwise in the right direction without helping it by hand. Take a rolag of wool and twist some of this on to the length of wool which comes out through the hole A in the spindle. Hold the wool lightly with the thumb (on top) and the fingers (below) of the left hand, and work the wheel when the wool begins to twist. With the right hand draw a few inches of fleece from the rolag, release the fleece in the left hand and let the yarn run on to the bobbin. A longer piece of fleece can be drawn from the

rolag as the worker gains confidence but real skill can be acquired only by constant practice.

At first the spun fleece may be very coarse and uneven but gradually a worker learns to control the number of fibres drawn from the rolag and gets a more even thread. The left hand should now draw the fleece from the rolag, the right hand holding the rolag and preventing the twist from going into this. As the spun thread held in the left hand is wound on to the bobbin, more fleece is drawn from the rolag, so the left hand moves from the right hand and then

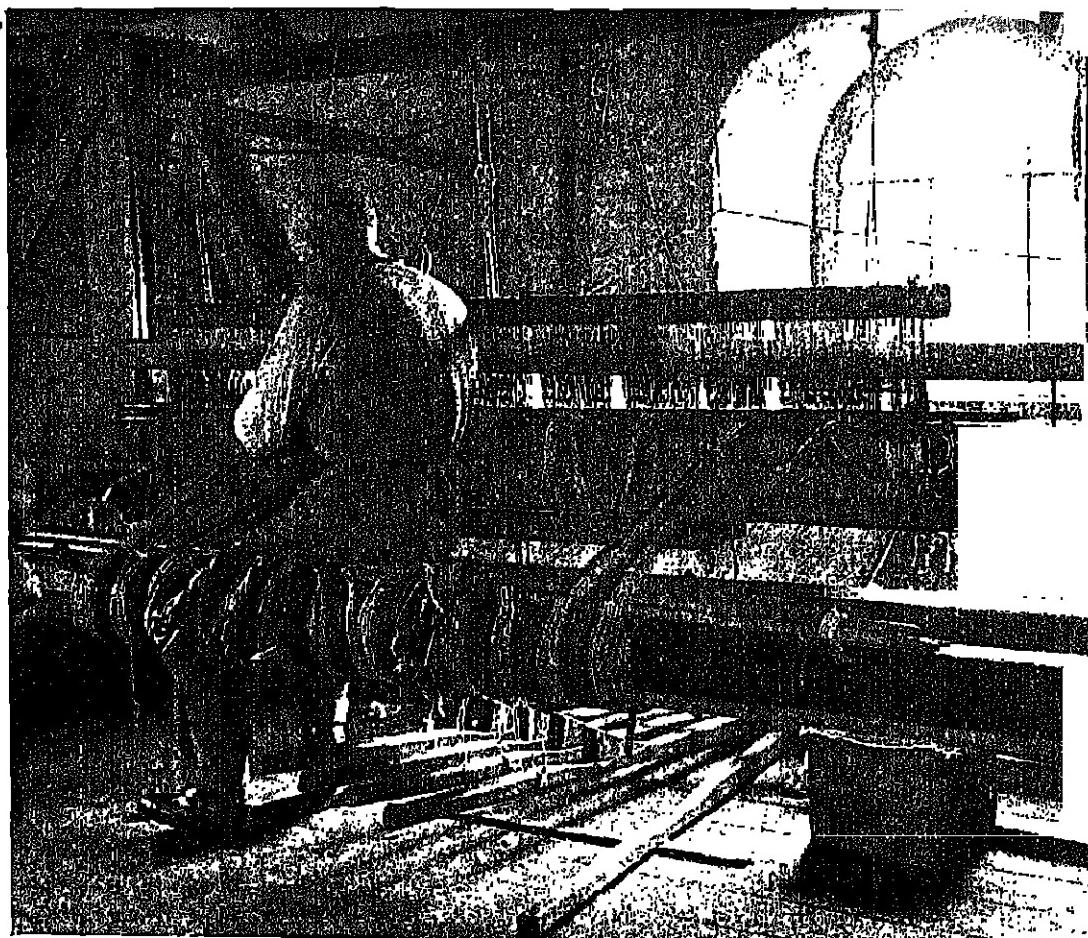


PLATE XXXII. TYING ON A WARP

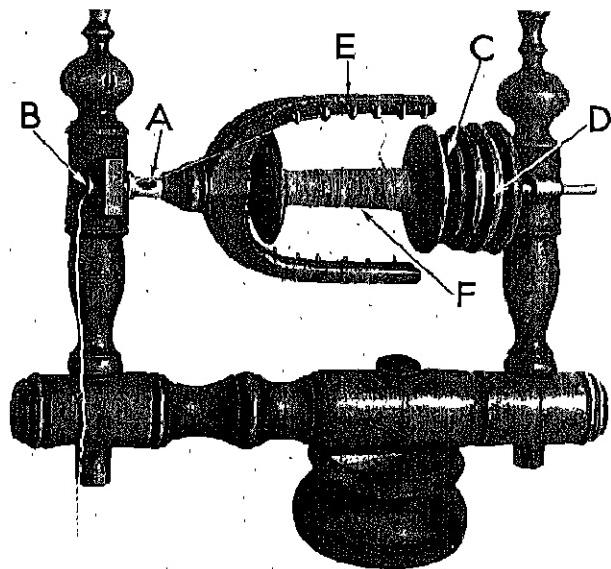


PLATE XXXIII. SPINDLE AND FLIERS OF SPINNING WHEEL
 A. Opening in rod through which wool passes, coming out at B.
 C. Bobbin pulley.
 D. Spindle pulley.
 E. Flier.
 F. Bobbin.

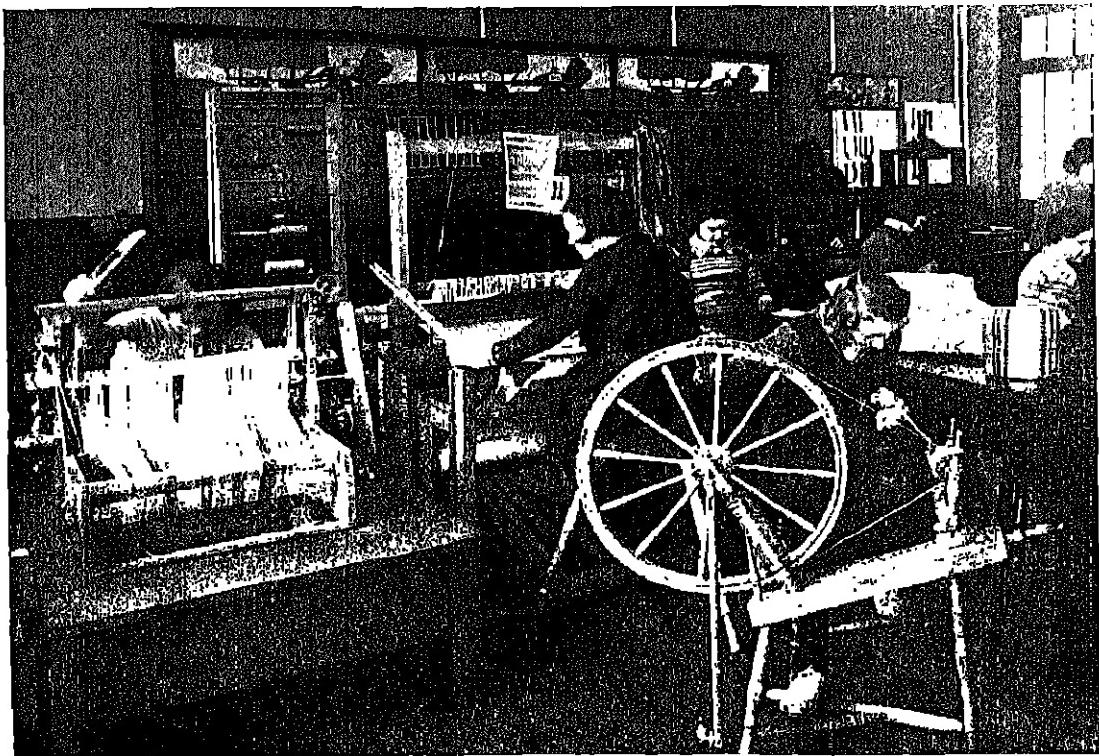


PLATE XXXIV. WEAVING CLASS

towards the bobbin in rhythmical movements.

Some girls take to spinning more easily than others; with some it seems almost a natural gift, while others seem to acquire the knack quite suddenly or may practise for a long time without gaining the necessary skill. The chief points to remember are:—
 (1) The movement of pedal and wheel should be smooth and rhythmical rather than quick and spasmodic, (2) The wool should be held lightly in the fingers, (3) The wool should be passed at a steady pace on to the bobbin and not kept too long in the fingers, or it will be too tightly spun and harsh to use.

(4) On no account should the twist be allowed to go into the rolag, or results will be disastrous. (5) Beginners should aim at getting an even rather than a very fine thread.

When the bobbin is filled with spun wool, the bobbin can either be removed from its position and another one inserted or the wool can be wound into hanks from the bobbin while in its position. This is done by slipping the driving band from the wheel, when the bobbin will rotate easily and the wool can be wound on the hands into a hank of convenient size. The ends of wool should be secured and the hank tied in several places ready for washing and dyeing.

VII. TRIMMINGS, AND MAKING UP HAND-WOVEN MATERIAL

MANY of the articles made up from hand-woven fabric will need the addition of cords, plaits, etc., so instructions will now be given for making cords of various types.

Looped cord, or finger crochet.—This gives a rounded cord, most useful for bags, cushions, girdles, etc., and has the advantage that it does not unravel.

1. Allow several strands of each of two contrasting colours (red and beige) just over four times the length of the finished cord and tie a knot at one end.

2. Hold the knot between the thumb and finger of the left hand, the beige wool on the left, red on the right.

3. Bring the beige wool over the left forefinger and place it behind the red strands.

4. Hold the wool in this position with the knot.

5. With the left forefinger (which is still through the beige loop) hook the red wool through this loop, when it now takes the place of the beige loop.

6. Now pull the beige strand tight.

7. Hook the beige wool through the red loop and pull the red strand tight and repeat this process; i.e., pull the beige strands through the red loop and the red strands through the beige loop, alternately tightening the loop on the finger in each case by pulling the strands of the opposite colour and transferring the loop from hand to hand each time.

When the end of the cord is reached pull the one bundle of strands through the last loop and pull the loop tight.

Knotted cord on stretched foundation.—

1. Take a thick strand of wool or a bunch of finer strands for a foundation.

2. Tie a strand of wool in each of two colours at one end of this.

3. Pin the knots to the knee or to a desk.

4. Make a blanket stitch with one strand of coloured wool on one side of the foundation threads.

5. Next make a blanket stitch with the other coloured thread on the opposite side of the foundation.

6. Repeat this, taking each colour alternately to the end. This gives a flat cord with a firm attractive blanket stitched edge along each side.

Knitted cord.—This is made on needles with points at both ends.

1. Cast on 4 stitches.

2. Knit these each time from the front of the work, pulling the wool from the last stitch on the row, across the back of the work ready to work the first stitch on the next row. This gives a round cord, similar to the French knitting described next.

French knitting.—This is done on a cotton reel as follows:—

1. Put five brass shoe rivets or small-headed nails in the top of the cotton reel spaced evenly about $\frac{1}{8}$ in. from the hole.

2. Tie the wool to one nail, leaving 4 to 6 in., and thread the end of the wool through the hole in the reel so that the cord can be pulled through as it is made.

3. Twist the wool round each of the remaining rivets.

4. Bring the wool in front of the one knotted strand and using a darning needle pick up the knotted loop and slip over this strand.

5. Bring the wool in front of the next rivet and pass the loop over again.

6. Continue round and round, pulling the cord through the hole in the reel as it is made.

7. To finish the cord, thread the end of the wool in a needle eye and take the needle through each loop as it is slipped off the rivet, then pull tight and stitch the end firmly.

This is an old-fashioned type of cord which children in the past used for making reins, etc., in multi-coloured wool. Nevertheless it is a useful cord as it can be made in any colour to match the weaving.

Plaits.—Plaits are useful for finishing off articles especially in the case of raffia work. The three plait is a common one with which

almost everyone is familiar, but the wider flat plaits with an odd or even number of strands are less well known.

Method.—1. Take any number of strands according to the width required, in any case not more than 10 or 12.

2. Tie each of these on to a piece of dowel rod or pencil.

3. This should be fixed behind two nails driven into a board or tied to a hook in the wall.

4. Take the strand on the left and weave this under one, over one to the right side.

5. Repeat this with the other strands holding the plait as it is made between the thumb and fingers to keep it flat.

Though at first it may be somewhat confusing it becomes easier as the work proceeds. Several distinctive colours should be used for the early experiments as they are easier for children to place in their right order.

Twisted cord in wool.—Allow several strands of wool $2\frac{1}{2}$ times the length of cord required. Two children should assist in making this cord.

1. Knot the strands at both ends.

2. Slip a pencil through the centre of the bunch of strands near the knot.

3. Each child should hold the wool with the fingers below the knot and begin to twist the pencil, one child to the right, the other to the left.

4. When the strands are tightly twisted, thread one end of the cord through the handle of a pair of scissors and move these along to the centre of the cord.

5. Take the two pencils in one hand and hold the hand as high up as possible when the scissors, acting as a spinning whorl, will twist the cord.

6. When the cord is twisted evenly it can be knotted at each end and the scissors removed by cutting the strands, which should be reknotted later.

Twisted cord in raffia.—As raffia strands are of limited length, a twisted cord cannot

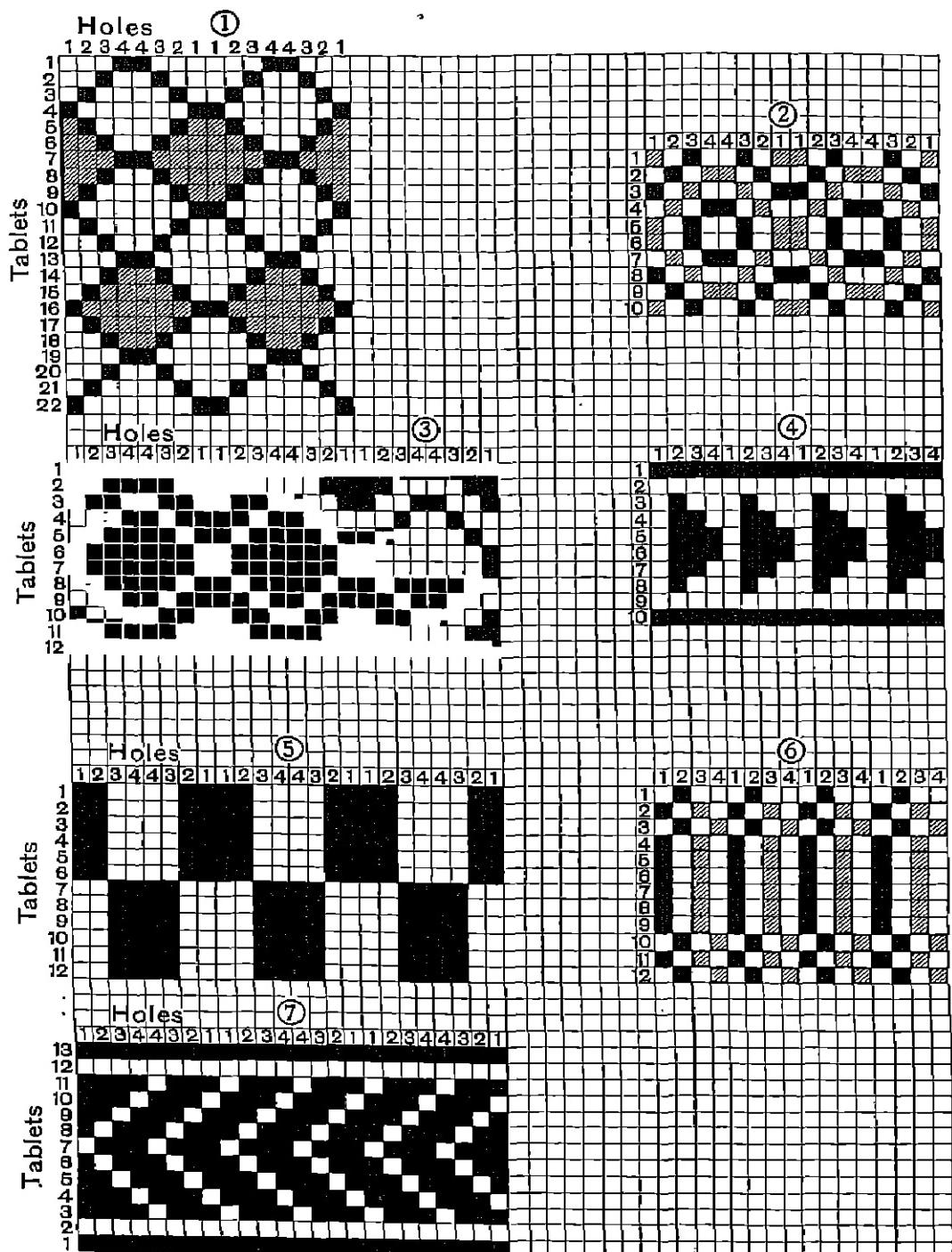
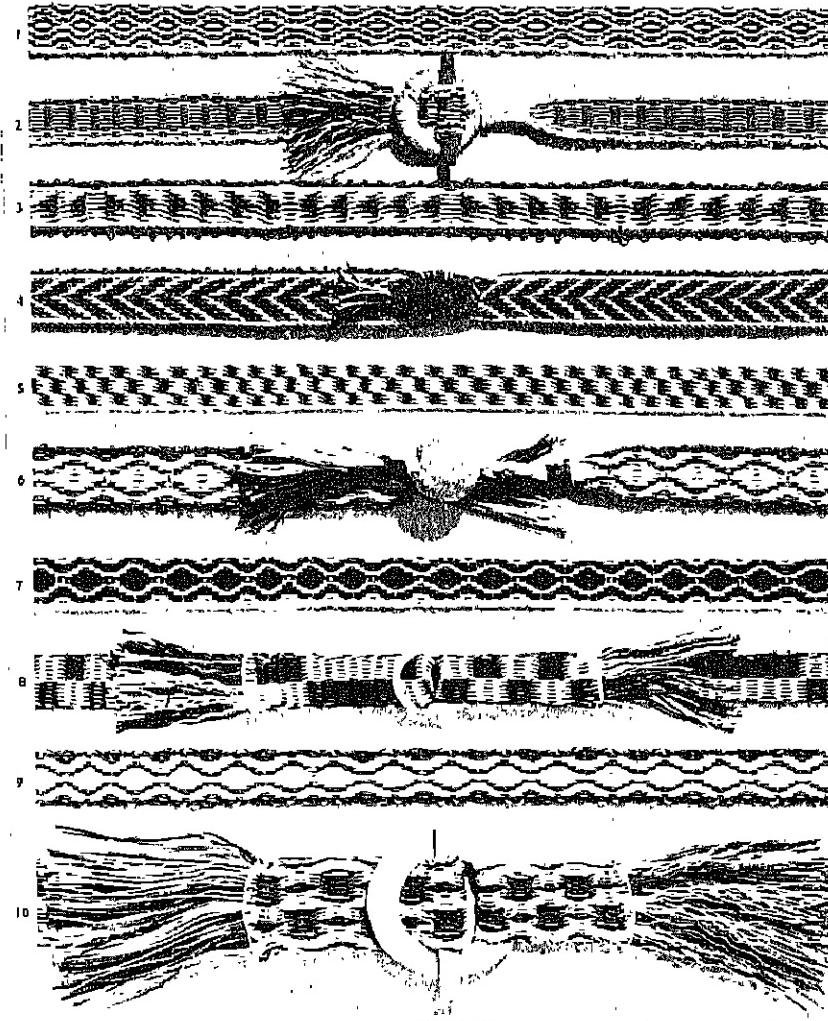


FIG. 33. PATTERN DRAFTS FOR TABLET WEAVING
(See examples of Belts on Class Picture No. 130 in the Portfolio.)



DRAFT NO. 1

Braid No. 10 (pattern hidden by turned back end of braid). Thread No. 22 fine. Thread first, four loops above, next three from below, continue three from above, three from below, diagonally. Turn four-quarter turns to right, then to left.

DRAFT NO. 2

Braid No. 1. 3 tablets, edge, plain, 12 wires. Thread No. 12 tablet first. No. 1 on top. First six threads down, others up from below.

DRAFT NO. 3

Braid No. 6 (Fig. 9). This braid can be varied by adding more tablets on either side. Turn four-quarter turns to right and four to left.

DRAFT NO. 4

Braid No. 3. Thread No. 10. tablet first so that No. 1 is on top. Turn twenty-eight to right and then twenty to left. Note break in pattern.

DRAFT NO. 5

Braid No. 8. Turn six tablets two quarter turns to right thus reversing position of two colours, then six to left. Braid No. 5 shows a variation relieved by turning the middle four tablets two-quarter turns to right and left.

DRAFT NO. 6

Braid No. 2. This is a variation of Braid No. 5 and 8, vertical stripes.

DRAFT NO. 7

Braid No. 4. Thirteen tablets twisted in one direction.

TABLET WEAVING

(Class Picture No. 130 in the Portfolio.)
For the description of this Class Picture see page 411.

be made in the same way as for wool. It must be done as follows:—

1. Take a few strands of each of two colours and knot them together at one end.
2. Holding a bunch of coloured strands in each hand and keeping the hands as far apart as possible, twist both bunches between

the thumb and fingers to the *left* for a distance of approximately 1 in.

3. Take the left-hand bunch over to the right hand, the right bunch passing under to the left.

4. Repeat the twisting to the left and passing of left bunch over to the right hand.

5. As the ends of some of the raffia strands are reached, new ones can be added to preserve an even thickness.

6. When the end of the cord is reached it can be wrapped with a strand of raffia.

7. An extra twist in another colour can be added if desired. Tie the new strands at the end of the cord just completed.

8. Then with the new strands in the left hand and the cord in the right, the new strands only should be twisted to the left and then passed over to the right hand, and the cord to the left. The new twist fits into the groove between the other two colours and makes an attractive and very strong 3-ply cord.

Braids.—Braids with stripes, plaids or inlay pattern are also useful for trimmings and can be made on a braid loom. In the same way a narrow woven strip can be made for holding down the flap of a bag or pochette, etc. Braids showing warp

pattern only, as mentioned in an earlier chapter, can also be used but possibly some of the most useful braids can be made with tablets.

Tablet weaving.—Tablet weaving is most useful for trimming belts and other accessories. Class Picture No. 130 shows a set of belts in tablet weaving. Fig. 33 shows drafts for these. They are woven in macramé string and in most cases have an attractive home-made buckle attached. Plate XXXV shows similar braids used for reins and the straps on sandals. Other ideas will no doubt suggest themselves to the worker.

Tablet weaving is one of the oldest crafts and several pieces are to be found dated about the sixth century. Tablets belonging to the Roman period have been found. These were made of bone, and in the East are often made of leather, old playing cards, etc.

The braids were used for harness for

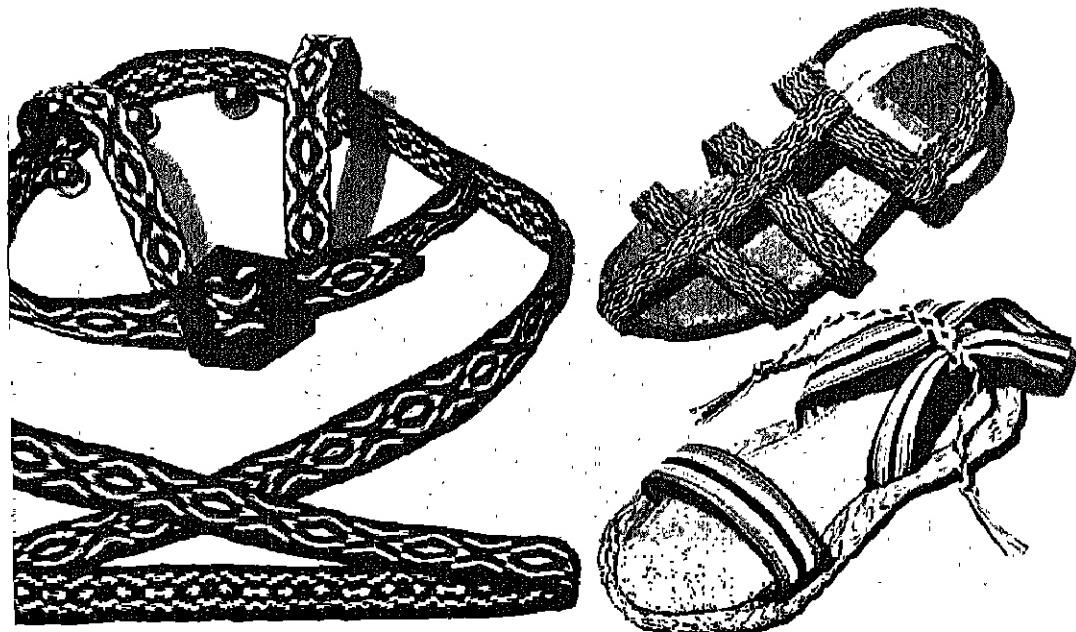


PLATE XXXV. TABLET WEAVING

camels, belts, edges of shawls, etc., and some most interesting examples are to be found in museums; e.g., South Kensington, Royal Albert, etc.

Tablet weaving is particularly suitable for school purposes and forms a definite stage in the history of weaving. From experience it is found that certain types of children take to tablet weaving more than others and these children should be allowed the fullest possible scope for experiment and practice. Having been briefly explained the principles of tablet weaving and allowed to see a few good samples of work and a few pattern drafts, the children can be left to experiment by themselves. Tablet weaving needs little teaching and best results are obtained if the suggestions indicated above are adopted.

Little equipment is required. A set of tablets should be made or bought. Tablets made of thin smooth card will suffice for the early experiments but thin fibre, bone, celluloid or metal ones can be bought quite cheaply. These are generally about 2 in. square with rounded corners and a hole at each corner numbered 1, 2, 3, 4, through which the thread passes. Strong threads are essential, preferably cotton, silk or macramé string. Wool, owing to its loose fibres, is not altogether satisfactory as the fibres prevent the free movement of the tablets. Macramé string, being particularly smooth and coarse, is suitable for the early experiments. The weft thread should be of similar but finer material in the same colour as the end threads in the braid. Shuttles can be made in thin cardboard or wood, and bone tatting shuttles can be bought which are most suitable for the finer threads. Beaters for pressing up the rows of weft can be made from a ruler or thin piece of wood or metal, or a comb could be used quite satisfactorily.

Two methods can be adopted for keeping the threads taut:—(1) They can be tied to a ring or rod and attached to the waist (as suggested for the waist loom). (2) They can be stretched between two posts fixed

to the table. Two warping posts fixed at a distance apart, according to the length of braid required, would suffice, and can easily be adjusted if the warp slackens.

If warping posts are used the tablets remain flat in a horizontal position, and are turned from right to left or *vice versa*, but if the tablets are used as a waist loom, they remain on their edges and are turned away from or towards the worker. In the latter case the flat braid is directly in front of the worker. For demonstration purposes a teacher should make one or two tablets in 3-ply wood and thread these with coarse wool or string so that she can demonstrate the principle of turning the tablets and inserting the weft to the children.

Place tablets with No. 1 at top left; 2 at top right; 3 at bottom right; 4 at bottom left.

Thread several tablets with four contrasting colours and one thread through each hole and pass a weft thread through the shed. Now grip the group of tablets together and turn them a quarter turn to the left. This produces another shed and a weft thread should be passed through. This turn will change the position of all the holes. No. 1 will now be in the original position of 4, and so on. Turn the tablets a second quarter turn to the left, a third and then a fourth, passing a weft thread through the shed each time. This brings No. 1 to its original position. It will be seen that twelve or more tablets can be used and turned to right or left easily after practice with four. If the weaving is examined it will be seen that only one warp thread from each tablet is visible on the surface of the braid, so that if ten tablets are used with four threads in each, only ten threads are visible on the surface of the braid. This is the chief point to remember when drafting patterns.

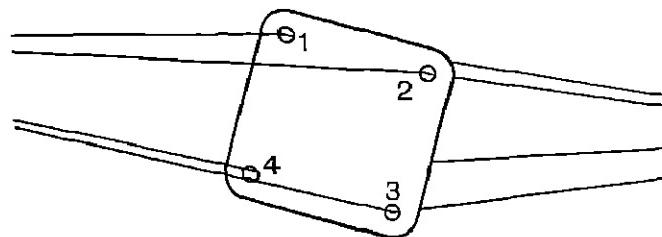
If the tablets are always turned in the same direction the warp threads tend to twist and form a rope. This necessitates the frequent unfastening and combing out of the warp threads at one end. If this is done the tablets should first be tied together

with a string so that they do not slip out of their right order. If a hole is punched through the centre of each tablet it simplifies this process considerably for a string or peg can pass through the centre hole of each and hold the whole group of tablets firmly in position. If the tablets are turned two or three turns to the right and the same number to the left, the warp threads remain straight in their original positions.

If the tablets are used as a waist loom, the woven braid must be rolled up as it is woven for convenience in weaving. Some of the simplest patterns are:—

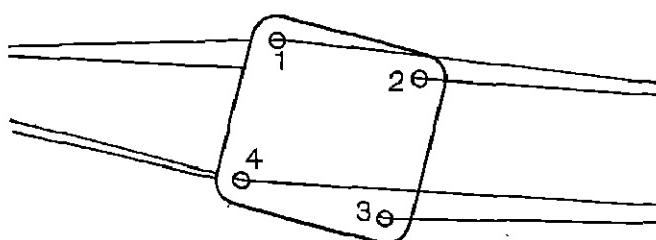
1. Two-way weaving, giving different colour on both sides. Thread twelve tablets with two blue threads through holes 1 and 2; two red threads through holes 3 and 4, and place all in position (No. 1 at top left). Turn tablets two quarter turns to left and then the same number to the right, and pass west through each time. This will result in a braid with one blue and one red side.

2. To interchange the colours on both sides of the braid the direction in which the tablets are turned should be changed. If



TABLET THREADED FROM ABOVE

FIG. 34



TABLET THREADED FROM BELOW

FIG. 35

they were turned to the left, they should next be turned to the right, when they regain the position in which they started; i.e., No. 1 at top left.

3. To make a braid in which half the width is red and half blue, the weaving should be done as follows:—Before starting from the original position turn tablets 7 to 12 two-quarter turns to the right, thus reversing the position of the red and blue threads. Weave as before with two-quarter turns to left and right. Colours can be reversed as suggested previously.

4. Various patterns in checks and stripes are produced by changing the position of various groups of tablets; e.g., the four middle ones, etc., before beginning to weave. This can be discovered by experiment only.

Drafts (Fig. 33).—Children should draft their various patterns. Each square in the drafts in Fig. 33 represents one tablet and these are numbered 1 to 12 or in accordance with the number of tablets used, and each square numbered across the top of the draft represents one hole of each tablet.

At first the tablets should be threaded in one direction only (see Fig. 34) from top of tablet, but later they can be threaded from underneath, see Fig. 35. Experiments can be made in threading tablets in both directions. If tablets are threaded alternately from the top and the under-side the finished braid has a chain effect. If the tablets for one-half of the braid are threaded from the top and the other half from the under-side then the braid retains its balance and seems to radiate from the centre.

The width of the braid can be increased by the addition of extra tablets for the two edges. Braids can be woven in two, three or more colours. Braids can be finished off with

a fringe, or by knotting the warp threads to prevent them from unravelling. The ends could also be plaited in groups—a method adopted by many of the primitive weavers.

Finishing.—This scheme of weaving would not be complete without mention of the finishing and making up of hand-woven fabrics. All children should have as wide an experience as possible in this. When fabrics are removed from the loom, any flaws in the weaving must be corrected; this process is known as "mending." If it is found that the weft thread has slipped over one or two warp strands without being caught in, this long strand must be cut at one end. A new weft strand is darned into the warp strands in correct order and overlaps the old weft thread for a few strands at each end. The ends are then cut close and will not be discernible when pressed later. Any knots which appear in the warp should be cut and a new piece darned in as before. Where the end of the warp strand has been left and wrapped round a pin to hold it in place, this end should be darned into the fabric overlapping the other end of the warp strand for a distance of $\frac{1}{2}$ to 1 in. and cut off.

If the fabric has been pulled in any way in going over the roller, etc., the weft can be carefully stroked into position with the eye of a darning needle.

Making up hand-woven material.—Many weavers have in the past shown great timidity in cutting hand-woven material. Realising that the fabric is often more loosely woven than machine-made material and, therefore, much more likely to fray, weavers have tended to economise on the cutting of a garment. This has led to many of the ill-shaped and ill-fitting garments we have seen in use. These have often been shapeless with heavy blanket-stitched seams, fringed hems, etc. It was not until weavers realised that a well-fitting garment could be made that hand-woven fabrics came more into favour.

The material is cut in just the same way as machine-made fabric. If it has to be put away before being made up, it is a good plan to overcast the cut edges loosely, but it is better to make the garment up as soon as possible. The seams are joined with a fine machine stitch, the edges of the seams being treated in either of the following ways:—(1) Opened flat and bound at both edges; (2) opened flat and overcast; (3) opened flat and the raw edge turned under and machined close to the edge.

The last is the cheapest and possibly the most satisfactory method.

If a fine hem is to be made at the edge of a sleeve or skirt, the material should be turned down once and machined fairly close to the edge. The loose frayed edge can be cut off close to this stitching and the single hem, already made, turned down again and machined once more. Only one row of stitching then shows on the right side of the garment.

Another good plan to adopt for the edges of a cardigan, etc., is to turn down a single hem and put several rows of fine machine stitching on the right side, combining construction and decoration. All loose ends can be cut off; the hem is then quite secure and looks really well tailored. This principle can be adopted for the two edges of a scarf or belt, if cut from a piece of wide material.

Decorative stitchery can also be used quite satisfactorily in the making up of hand-woven material. The most useful stitches for this purpose are couching, blanket stitch, running, Y-stitching, etc., and if used in attractive colours to match or contrast with the garment some most pleasing results can be achieved.

Hats to match costumes and dresses can be made up at many milliners for a few shillings but can rarely be made very successfully by an amateur.

Bags can be made up in various ways. They can be made from several strips or all in one piece. The bag (No. 3) shown on Class Picture No. 128 was made in three strips (two plain and one patterned) from a

length of braid woven on a braid loom. If done in this way the length of each strip has to be calculated carefully before beginning to weave in order to get the strip of pattern weaving accurate. The three strips are joined neatly on the wrong side by fine over-sewing or they can be laid flat and the loops at each selvedge caught closely together. The seams are then pressed flat with a hot iron over a very damp cloth. The iron should be pressed on the fabric and not rubbed to and fro. The join at the edge of the pattern strip was decorated with a series of blanket stitches in groups, and strands of coloured wool were darned under and over these groups; the top of the bag was made with several rows of double crochet in wool to match the bag, with a central row of long trebles through which the cord passes. The wool bag was lined with a blue sponge cloth to match the blue in the patterned border.

The blue bag (No. 5) of hand-spun wool on Class Picture No. 127 has a narrow strip of weaving added for the top frill. The cord passes under a series of bands made on the outside of the bag. These are woven on a series of strands stretched to form a warp and they make a pleasing addition to the bag.

Other ideas will suggest themselves to the worker. If buttons are needed for trimming they can be made as follows:—

1. Plain wooden buttons with simple decoration, cut with a knife or chisel; oiled with linseed oil and drilled.

2. Button moulds, with strands of wool

or cotton passing through the centre to the outside circumference and back through centre, thus forming a warp which can be woven with suitable colours.

3. Professionally covered with hand-woven fabric.

4. Made on a wooden bead or ball of cotton wool as shown on Class Picture No. 130 (*Tablet Weaving*). These consist of a series of warp strands which can be intersected by the weft.

Buckles and bag tops can also be cut out by some of the older scholars or can often be made in the woodwork centre.

The motto for all hand-woven articles is "fitness for purpose." Construction and decoration should go hand in hand whenever possible and very modern factory-produced trimmings and fastenings should not be used if it is at all possible to devise something more suited to a primitive and beautiful craft. Children should be given the fullest possible scope for invention and experiment, when the results will often be surprising even to an experienced teacher and craft worker.

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DESCRIPTIONS OF CLASS PICTURES ON WEAVING

Class Picture No. 127.

1. SKIRT LENGTH.—Vegetable-dyed wool; single ply wool warp; hand-spun (on spindle) wool weft; 14 threads per inch.

Short strips of wool of different colours inserted in the weft for a portion of each shed, at intervals.

2. OLD PERSIAN TAPESTRY.—Cotton

warp; 14 thread per inch. Fine vegetable-dyed wool weft. Short slits apparent at the junction of two colours.

3. SAMPLER IN 3-PLY WOOL.—14 threads per inch, made on small roller loom; patterns darned in with shuttle. No. 1 pattern at bottom of sampler, No. 9 at top.

Details of borders as follows:—
No. 1 shows a reverse twill (over 3 under 1).
No. 9 shows a plain twill.

No. 2 pattern is made by passing six rows of coloured weft through the same shed, each row being followed by one row of tabby weaving.

No. 5 pattern is produced by weaving alternate rows in orange and green; plain tabby weaving.

No. 6 shows a twill (over 2 and under 2) in two colours, which give a pleasing variation of the twill produced by weaving with one colour only.

4. SCARF.—2-ply vegetable-dyed wool. Table loom; 14 threads per inch. Blue warp; green weft; rosepath pattern in orange. See threading draft No. 1. on Fig. 30.

5. WORKBAG.—2-ply warp, hand-spun weft; all vegetable-dyed. Made on braid loom from two strips each 6 in. wide and one strip (at top) 2½ in. wide. Pattern darned in with shuttle; twisted cord, strip for holding cord made by weaving on a foundation of 5 strands. The "construction" in this case forms the "decoration"—an excellent plan to adopt whenever possible in making up hand-woven fabrics.

6. SCARF.—Woven by girl of thirteen. Table loom; 2-ply vegetable-dyed wool for warp and weft (warp more tightly spun); 12 threads per inch. Colour scheme taken from butterfly's wing.

7. BRAID.—Woven by girl of twelve on Scottish inkle loom; 4-ply wool; 28 threads per inch. Warp pattern (weft entirely hidden by warp).

8. WORKBAG.—Foot power loom. Honeysuckle pattern (see threading draft No. 6, Fig. 30. Single ply (imitation hand-spun wool) used for both warp and weft; 14 threads per inch.

9. SCARF.—Roller loom with metlyx heddle; 3-ply wool; 14 threads per inch. Warp in two colours, mauve and pink alternately; weft mainly saxe blue but centre strip of scarf woven with alternate rows of saxe and jade; pattern for borders darned in with shuttle in same colours as the warp, with the addition of a touch of jade.

Glass Picture No. 128.

1. SCARF.—Woven in 3-ply wool on table loom. Honeysuckle borders, hemstitched ends (3 warp strands in each group).

2. HANDBAG.—Woven in 2-ply vegetable-dyed wool (16 threads per inch). Honeysuckle borders. Handle made from a continuous strip of tablet weaving (10 tablets), threaded through slits in the wooden frame.

3. BAG.—Woven in 2-ply vegetable-dyed wool (14 threads per inch). Braid loom; inlay pattern darned in with shuttle. Bag made of three strips; the two bottom strips are joined together with groups of blanket stitches; the top strip is joined to the middle one by sewing through the loops at both edges, on the wrong side, so that the work lies flat. The bag is finished off with a strip of crochet with slots through which a double cord is threaded. Green linen to match the colour of the inlay pattern is used for lining the bag.

4. SCARF.—Woven by girl of thirteen. 2-ply wool warp; hand-spun weft of ERI silk; all vegetable dyed. 16 threads per inch; knotted fringe.

5. POCHETTE.—Woven on a four-heddle box loom. Welsh tweed yarn, natural colour for warp and weft; 14 threads per inch.

6. PLAID SCARF.—2-ply wool; table loom; 14 threads per inch. Same colours used for both warp and weft. Hemstitched ends.

7. IRON HOLDER.—2-ply wool; braid loom; pattern darned in with shuttle. Strips and edges joined with blanket stitch.

8. CURTAIN.—2-ply wool in green tints. Natural grey, fine single ply wool weft (used

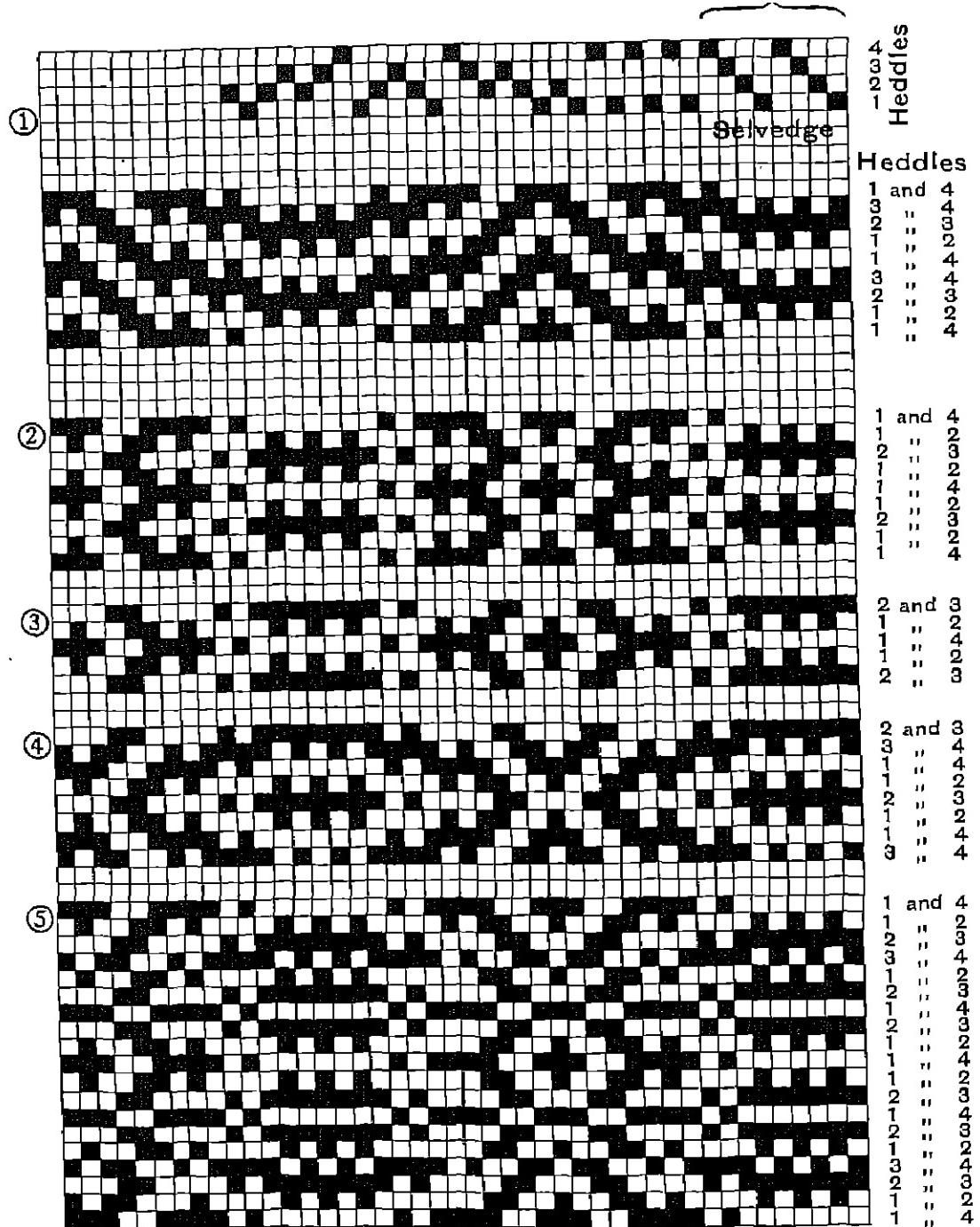


FIG. 36. HONEYSUCKLE BORDERS
 (Examples Nos. 3, 4 and 5 are taken from scarf No. 1 on Class Picture No. 129 in the Portfolio.)

double). Foot power loom. Honeysuckle borders in green 2-ply wool, knotted fringe.

9. BAG.—Braid loom; 2-ply vegetable-dyed wool. Bag made of three strips, two plain and one pattern.

10. SCARF.—Table loom; 2-ply wool. Honeysuckle borders. Warp of green shades (vegetable-dyed) wool. 16 threads per inch; knotted fringe.

11. TAPESTRY BAG.—Board loom, 2-ply wool. 12 threads per inch. Plaited loops and wooden buttons used for fastening.

12. HANDBAG.—Woven by girl of thirteen. 2-ply wool; 14 threads per inch. Cleveland web pattern (see threading draft No. 8, Fig. 30).

13. SERVIETTE.—In mercerised cotton. Table loom. 28 threads per inch.

14. BELT.—Warp of 2-ply wool used double; 14 threads per inch. Welt of 3-ply wool. Belt woven on metlyx heddle used as a "waist" loom. (*Note*.—2-ply wool used double produces a finer and flatter piece of fabric than would be possible if 4-ply wool were used.)

Class Picture No. 129.

1. SCARF.—Woven in 3-ply white wool, back pattern; 14 threads per inch. Drafts for borders woven on this scarf are given on Fig. 36 (Nos. 3 to 5).

2. POCHE TTE to match the above-mentioned scarf.

3. SCARF.—In 3-ply wool, woven by girl of thirteen; 14 threads per inch. This is an original adaptation of an American threading draft.

4. BLACK AND WHITE BAG.—Woven on four-heddle box loom. Pattern darned in with shuttle.

5 and 6. TWO SCARF ENDS woven in 2-ply wool on four-heddle home-made box loom. Rosepath threading draft.

7, 8, and 9. BAG AND POCHE TTES woven on four-heddle box loom. These represent early experiments in pattern. No. 7 shows a border woven from the monk's belt threading draft, No. 6, Fig. 30.

10. CUSHION.—In shades of brown and rust, 3-ply wool. Woven on home-made rigid heddle shown alongside the cushion. Note the ingenious method of cutting and joining the strips.

11. WORKBAG.—Woven in natural grey wool (2-ply). Blue-green borders from honeysuckle threading draft.

12. CUSHION.—Woven on table loom from butternut threading draft, No. 5, Fig. 30. Natural grey foundation, green pattern. 14 threads per inch.

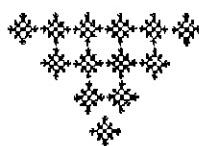
13. CUSHION.—Woven in mercerised cotton on foot power loom. Beige ground, orange pattern. Note the interesting border. Orange peel threading draft, No. 9, Fig. 30.

14. NEEDLE WEAVING in blue and green mercerised cotton on cream cotton foundation.

15. NEEDLE WEAVING in coarse mercerised cotton on hand-woven mercerised cotton foundation.

Class Picture No. 130.

This Class Picture illustrates samples of tablet weaving, drafts for which are given in Fig. 33, p. 412. For a full description of tablet weaving, see p. 414.



BEAUTY IN THE HOME

Introduction.—This series of illustrated talks aims at helping teachers to train the aesthetic sense of children and to guide them in their appreciation of beautiful things to be found in the home. The talks will form the basis of a supplementary course of lessons in art for older children.

In these talks, many kinds of household articles, domestic utensil and furnishing are considered and compared. As it would be difficult, if not impossible, for teachers to show actual examples of most of the things dealt with, these talks have been carefully illustrated by Class Pictures in the Portfolio which often give illustrations of both good and bad examples which can be compared by the children.

The important thing to be kept in mind throughout this series is that the main object is to train the eye of the child. Largely, this is a matter of arousing the children's interest, which can be stimulated by allowing them to take part in the selection of the good and bad examples, stating the reasons for their choice. They will soon find that they have never noticed many of the things around them although they see them every day. "Beauty in the home" is not something obtainable by the children of rich people only. All classes of homes can show evidence of good taste. Many people imagine that the good things are the most expensive, but this is not always the case. There are in these days things of every kind which would grace any home and which can be obtained at a reasonable cost.

The children will not all choose alike. There is a wide range of choice in all sorts of styles to suit different temperaments and fancies. Unfortunately, there is still a great deal of bad shape and design to be found in the shops, and in order to be able to choose it is necessary to be able to dis-

tinguish between good and bad. That is to be our aim throughout these talks. A warning must be given here. Tastes and opinions differ, hence as the children learn to develop their own tastes and personalities, so they must learn to respect and have consideration for quite different tastes and opinions of other children.

Some people imagine that the new is better than the old, and that old ideas are wrong. There seems to be a prevalent opinion among young people that the twentieth century is far in advance of all other centuries. So it is in many respects and whatever we may say in favour of the "good old times" we none of us would wish to return to such times and conditions. Each generation expresses itself in its own particular way. Children should not in any case become dissatisfied with their present surroundings but should learn to find what is good in them.

If, when hiking or motoring, we go into a little country cottage for tea, we are often surprised to find what a homely and comfortable atmosphere we have entered. Would we wish to change this? And what would we propose to put in its place? Good taste goes with good feeling, and these are the really important factors in this and in every age.

In art there is little progress, but continual change. What really happens is that certain art forms are developed to their fullest extent and are then discarded for something new and strange. Naturally, we find these new art forms difficult to appreciate and understand, and unless we have principles to guide us, "we shall be all at sea." We have especially to beware of prejudice. Each article, each subject, each new style, must be judged on its own merits rather than by comparison with others.



[From the painting in the Royal Academy of Arts, London, Diploma Gallery, by Leonardo da Vinci.]

THE VIRGIN AND ST. ANNE

I. THE BEAUTY OF LINE

The subject for the first talk is the study of two or three simple shapes of pottery. The first point to consider is the purpose for which the vessel is to be put.

Some Japanese vases, for example, have very small openings at the top, whereas English vases usually have wide mouths. The difference in shape is due to the difference between Oriental and Western ideas in regard to the arrangement of flowers. We like to see flowers in masses, even bunches of mixed flowers, hence the mouth of an English vase is comparatively large. The Japanese prefer to make a decorative arrangement of a single spray of leaves and blossoms, and this requires a narrow opening in the vase to show the spray properly. This difference in shape is an instance of the *purpose* deciding the *shape*.

Let us consider how to make a simple curve for a vase. Suppose we wish our vase to be 6 in. high. An opening at the top 2 in. across will be about right for the bunches of flowers. What size shall we make the vase at the bottom? Our first aim is to keep things simple, therefore, we do not want to add another size if we can avoid it, so we will try making the bottom and top the same size, 2 in. That gives us a simple framework on which to draw our vase. Notice that two is a third of six, so that our sizes are already definitely related.

The first figure on Plate I shows the framework of pencil lines. Now draw curves which join the top and bottom points on either side, like Fig. 1. If compasses are used to draw the curves, the point of the compass would be on the centre line that goes across the page.

Now let us try another shape on the framework. With compasses extended to $1\frac{1}{2}$ in. move the point on the upright middle line until the radius touches the top corners A and B, and draw parts of a circle on each side. With a straightedge draw lines joining these radii with points at the bottom. Fig. 2 is exactly the same as Fig. 3, only the curves are at the top instead of at the bottom.

For Figs. 4 and 5 we have only to put convex curves in place of the straight lines; and for Fig. 6 draw concave curves. Fig. 6, when turned up the other way, shows a conventional Oriental shape. All these shapes should be cut out by the children in paper.

Measurements are given to ensure some sort of uniformity. Let the children draw the curves and shapes by eye alone. Teach them to use the scissors for cutting and their hands for modelling. Encourage them to make large curves with the arm at full length, using the shoulder as a radius. Pivot at the elbow and wrist to make smaller curves.

Point out to the children some of the curves in nature; e.g., the flowing curves of waves and of hills and valleys; the line of travel of a rocket; the full arc of a rainbow; the curves in birds and fish and animals.

Tell the children how engineers have found that curves eliminate or lessen wind pressure and give the birds and animals swifter flight, so that when they design a machine for speed—such as an aeroplane or a motor car—they use these streamline curves.

Endeavour to make the children see how valuable the curved outline is in giving life and movement to what would otherwise be a dead piece of clay.

Let the children make curves of all kinds with the pencil and with the brush.

Show the children pictures of streamlined motor cars, railway engines and trains. If possible show a bird's wing and point out how it is made up entirely of curves. Then, too, there are the lovely curves of a cumulous cloud. Remind the children that although nature plans tree trunks and branches, the stems of flowers and grasses and many plant growths to be straight, the sun and the wind are always tending to curve them. Nature has curves everywhere. The children themselves are all curves. See what a beautiful design in curves is an arm or a leg. Just as curves give life and create rhythm, so straight lines give force and vigour.

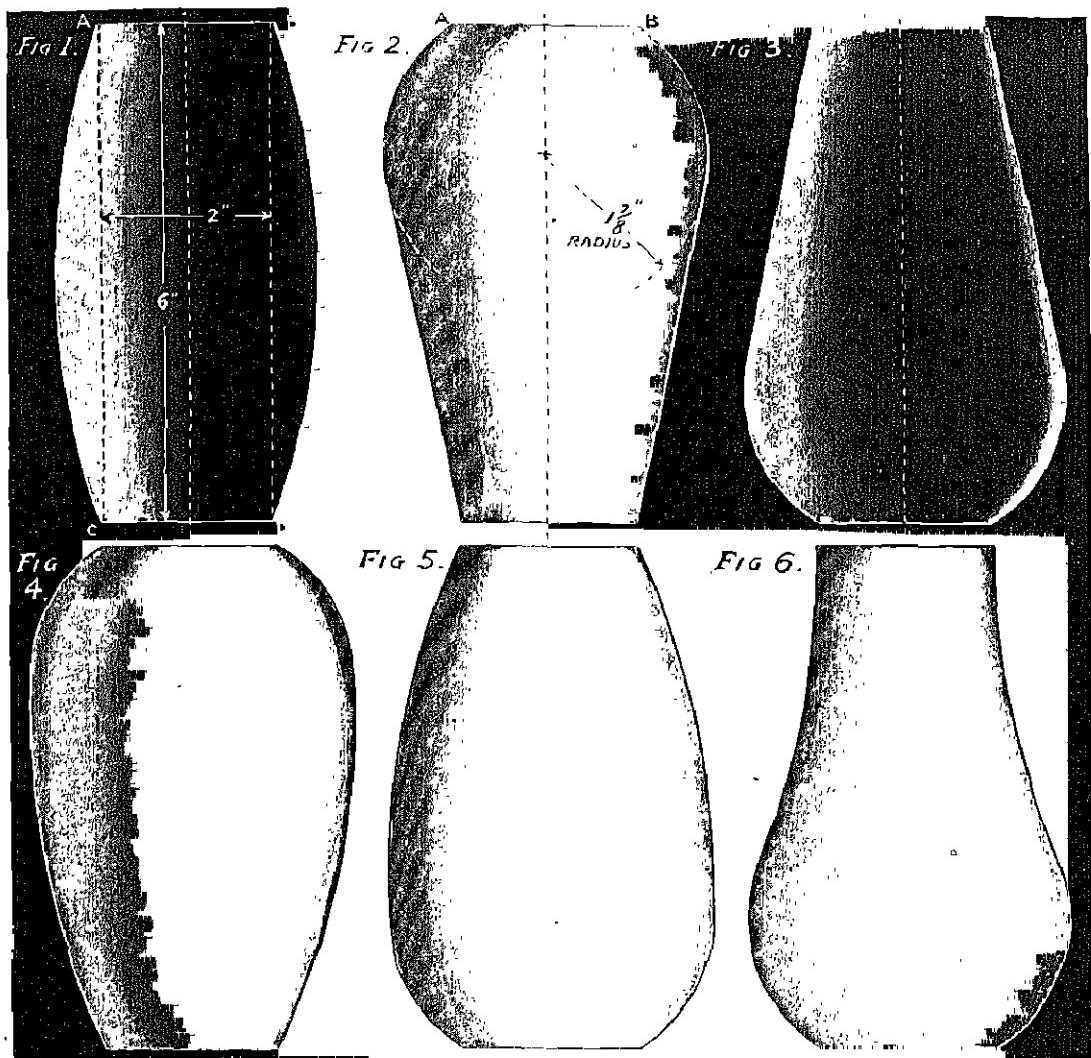


PLATE I.—THE LINE OF A VASE
(Class Picture No. 9½ in the Portfolio.)

Horizontal lines give stability and convey an impression of calm, peace and rest.

Vertical lines give balance. If they are ascending they suggest growth, life and aspiration. If descending they convey a feeling of something coming to an end, regret and sadness. One thinks of the vigorous upright growth of a poplar or an elm for the ascending lines, and the drooping foliage of a weeping willow for the descending lines.

Sloping lines give direction, action and liveliness. Perhaps the simplest example to give is this: draw a horizontal line as a base, and from that a sloping line going off at an angle. The drawing suggests movement towards the left, to imagine this same shape moving to the right, requires a definite mental effort.

One of the most vigorous and exciting lines we know is that by which we usually express lightning

II. PROPORTION

In this second talk we want to consider the general effect, or mass.

The curved sides of the vase shapes which are here shown down the left-hand side of the Plate are exactly the same shapes that were drawn in the last talk, only here they are reduced in size.

It is important to realise that directly the general proportion is altered it is necessary to alter the curves to suit the new proportion.

Let us take the first three shapes. Suppose it is decided to make vessels more square in general proportion. The former vases were all 6 in. in height. We draw exactly the same curves with more material between them, until we have shapes 6 in. wide as well as high. The result is seen in the three middle examples, 2A, 4A, 6A. They look rather dull, heavy, cumbersome shapes. We feel immediately the need for rounder, fuller and more generous curves in order to get more feeling of life into the shapes. The examples shown to the right of these—2B, 4B, 6B,—show something of the sort of curves and shapes at which we should aim. In these we have necessarily had to reduce the size of the base and also the opening in the top of each vase, but our shapes have ample stability and sufficiently wide mouths, so we find that with more material and squarer shapes, we must use fuller and more generous curves.

Let us see what happens if we use less material, as shown in the diagrams at the foot of the Plate.

We have only to draw the original curves (as in Figs. 5 and 6) closer together to make a vase half the width of these, to find that the shapes have not sufficient base on which to stand safely, or sufficiently wide necks in which to put anything. In any case, it becomes obvious that for a tall slender vessel we need much flatter curves, thus making it more graceful and elegant, slimmer in fact, something like 5B and 6B. With 6B, too, we should probably add a rim to enlarge the base to allow the vase to stand safely. So we find

that our feelings about the mass or general proportion dictate what sort of curves we use.

There is one proportion which is generally accepted nowadays and has existed and been in use for centuries. It is known by several names, and is referred to as the Golden Rod, the Golden Rule, the Golden Measure, or the Divine Proportion. To give a rough idea of it, take a stick or strip of paper 8 in. long; mark off 3 in. from one end so that the other end is 5 in. long. This proportion of 3 to 5 represents the Golden Rod.

In teaching this proportion it might be useful to have a rod in the classroom on which from time to time children could demonstrate the place of division that gives the two most pleasing proportions. This rod might have a notch or mark which could be kept on the underside until the children had made their decision. Then it could be turned over to show how near they were.

This proportion has the unique faculty of continuous extension. For instance, $3 = 5$; $5 = 8$; $8 = 13$; $13 = 21$, and so on. Mathematically, the ratio is 1 to 1.618 (approximately). There are other proportions which generally delight the eye. Ratios of all kinds are pleasing. By ratios we mean shapes or forms ascending or descending in scale of proportion. A simple example is a wedding cake, which has three tiers one above the other, with the largest at the base and the smallest on top.

Much of our furniture and interior decoration use this principle. An excellent example occurs in some ladder-back chairs where the spaces between the back slats decrease in depth as they go upward, Fig. 7.

In most chests of drawers all the drawers are not made of the same depth. The bottom drawer is deepest and those above graduate in depth with the shallowest at the top. The tallboy chest of drawers (Fig. 9) shows this clearly. It not only makes differently shaped receptacles for various kinds of articles, but is such an arrangement of shapes

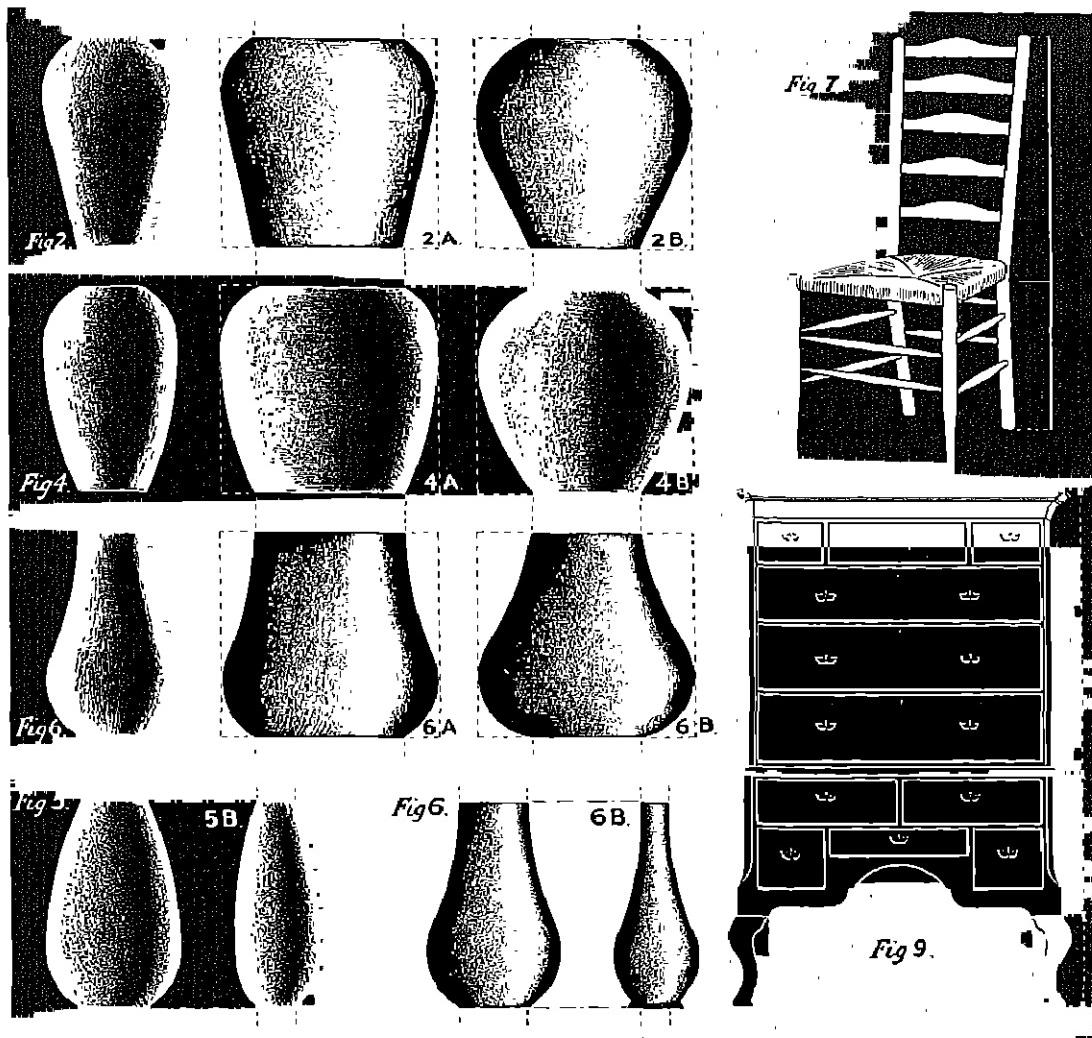


PLATE II.—PROPORTION
(Class Picture No. 95 In the Portfolio.)

and proportions that is pleasing to the eye—in fact, it is a handsome piece of furniture.

We probably find these ratios pleasing because the eye does not travel easily vertically. The eye can follow lines and shapes up or down in a series of steps which make a gentler progression, while the variation in the height of the steps obviates the monotony there would be if all the steps were the same distance apart.

Test raising the eyes vertically on some very tall building, or better still, on some tall slender shape such as Nelson's Column in Trafalgar Square. It requires a noticeable mental effort to make the eye travel slowly from the base to the very top, and when that is reached one has a distinct feeling of achievement, which is one of the principal things that the designer wished us to feel.

III. COLOUR

Plate III shows Japanese prints. These have been chosen because the colour is used in an entirely *expressive* manner. That means that the artists have not copied nature closely, but have carefully chosen the important things they want us to be conscious of, and then stated them as simply and directly as possible and in a way best suited to the medium they were using.

In the top corner picture of two girls gathering shellfish, the setting or background for the two figures is simply grey and blue—the ordinary colours of the seashore eminently suited to and expressive of the girls' quiet occupation. From this very peaceful, quiet picture, pass to the central one which has yellow and gold in sharp contrast to black. This is a portrait of an actor playing the part of the heroine (for in Japan the women's parts were always played by men). The colour at once shows that the real subject is nobility and tragedy.

No. 3 is again a quiet scene from a series on silkworm culture. It shows a girl spinning the silk from the cocoon and another talking to her. It is a more domestic scene than that of the first picture and consequently is painted in a warmer colour scheme. Note that the fire on the left-hand side is of the same dull red as the sashes of the two girls. It is sufficiently red for us to see that it is fire. To have introduced a bright red on the extreme edge of the picture would have attracted the eye to a wrong spot and given that incident too much importance.

Below these are two landscapes by Hiroshige (pronounced Hero-she-jee, soft *j*) who was one of the world's greatest landscape painters. Along the top and bottom of each of these scenes there is a sudden gradation into deep colour. This is so contrary to our Western ideas that we wonder what it means and what it does. Let us take the left-hand view first—a yellow sky gradating into grey to black. The black is menacing but the yellow is cheerful and reassuring. It means a *passing*

shower. The descending lines across the sky suggest the first falling drops of rain, while the people crossing the bridge hurry for shelter.

The artist knows that the sky is not so black in nature; but he feels justified in a slight exaggeration—for with the Oriental, each picture is a dramatisation of expression. Drama, being condensed in time and space owing to the limits and conditions of the stage, needs exaggeration to bring out the important features and keep the relative proportions and values in right order. And what is our picture space but a small stage on which to show immense distance and scenes, and great happenings?

This gradation at the top and bottom of the picture is used to influence the beholder in several ways:

1. It sets the mood of the picture as explained above—menacing, but ultimately reassuring.

2. It suggests the dome of the sky.

3. It serves to make a balance of darks throughout the picture. Cut out these dark passages at the top and bottom and you will see that you have a dark band of pattern running across the middle of the picture and nothing to balance it or keep it in place.

4. The exaggeration in depth of colour puts the landscape part back in its proper place and gives distance and perspective. See how the dark blue serves to bring forward the near end of the bridge.

5. It serves to call our attention to the full limits, from top to bottom of our picture space. Without them we should fully realise only about two-thirds of the picture. We might be conscious of the other third but it would really play little part in the drama which we are watching.

6. The small upright river scene in moonlight shows the gradations used to express depth and surface of water.

So we find that a simple device which at first sight looked strange and unusual has at least half a dozen different meanings for



PLATE III.—JAPANESE PRINTS
(Class Picture No. 96 in the Portfolio.)

us. Each expresses something we feel about nature rather than copies what we see. It is personal and creative. It shows inventiveness as well as acute observation of nature. Yet truth to nature in its broader values and large aspects is maintained all through these landscapes.

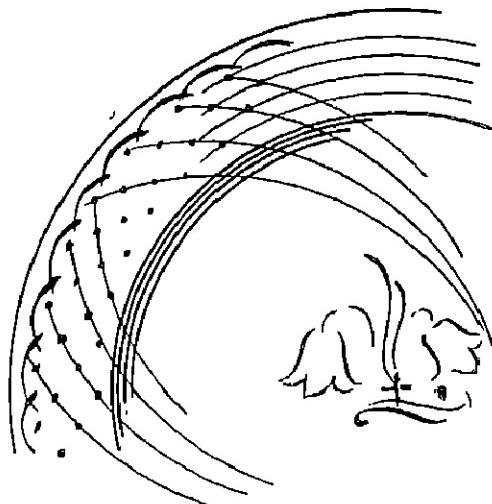
Having looked at each print separately, let us look at the colour of our Class Picture as a whole. Although these five pictures

were made by four different artists who lived in different periods, and although they are of entirely different subjects, they all go harmoniously together. There are no bright spots which jump out at us. The colour is all clean and vibrating. There are three pictures in warm tones and two in cool schemes. What we particularly notice is that each one of these pictures has its colour scheme held together and harmonised by the use of greys.

IV. DECORATION

Naturalistic bunches or sprays of flowers for the decoration of china-ware still survive from Victorian times. Naturalistic roses, violets, pansies, lilies, etc., are all out of place on any kind of pottery. Flowers are used as decoration because of their colour, but they should be formalised and not made to look real.

Plate IV illustrates some good examples of decoration. Here we notice how simple the patterns are—this is because the shapes of the articles are good, so that there is no need for a great deal of fancy work. For instance, on two of the dinner services,



A SIMPLE BUT EFFECTIVE DESIGN

Nos. 3 and 4, there is no decoration beyond a slight ribbing, and even this is not an added pattern but something which occurs during the manufacture of the article. Each style is in a self-colour—No. 3 is a beautiful deep golden yellow; No. 4 has a cream or pale yellow glaze. You would have to look closely at No. 3 to notice the ribs or grooves indented round each piece of the set, for this is decoration at its very slightest, depending entirely on shape and colour for its effect.

In No. 4 the slightly scalloped lines running round each article are broad and suffi-

ciently marked to divide the larger spaces and to follow and accentuate the main lines. Note the vegetable dish—the main line running from the tip of one handle to the tip of the other, the balance of proportion above and below that line, the shape of the handles, the lid and the markings all show care and skill in design and a complete unity in effect.

On No. 1, a tea service, a gold line runs round the outside edge of each piece, while another gold line runs round the inner edge of the rim of the plate and at a similar distance on each of the other pieces. Just inside the edge each piece has a continuous line of loops suggesting leaves formed by tiny brush strokes of bright green. This simple decoration of gold and green on the white background is most effective.

No. 5, a breakfast, dinner and tea service, has four lines alternately gold and green running at equal distances round the rims.

No. 6 is equally simple, but requires more detailed description and explanation. Just within the outer edge of each piece is a line made up of arched brush strokes inside which are four lines of dots. This may at first sight appear a curious and elaborate form of decoration adding little to the general effect; but, in actual fact, it proves to be a simple and extremely subtle pattern. The purpose of the dots is to relieve the monotony of an otherwise flat surface. Notice the subtlety of the arrangement of these dots—they are in four lines following the outer edge, at the same time radiating from the centre of the plate. (See sketches).

The small centre decoration, in bright colour, gives a note of gaiety, at the same time illustrating the important fact that flowers should be formal rather than realistic in design—it is impossible to tell what flowers they are since they are merely spots of colour well arranged. It should be noticed that this central *motif* necessitates a side handle on the lid of the vegetable dish.

Example No. 2 on the Class Picture is a

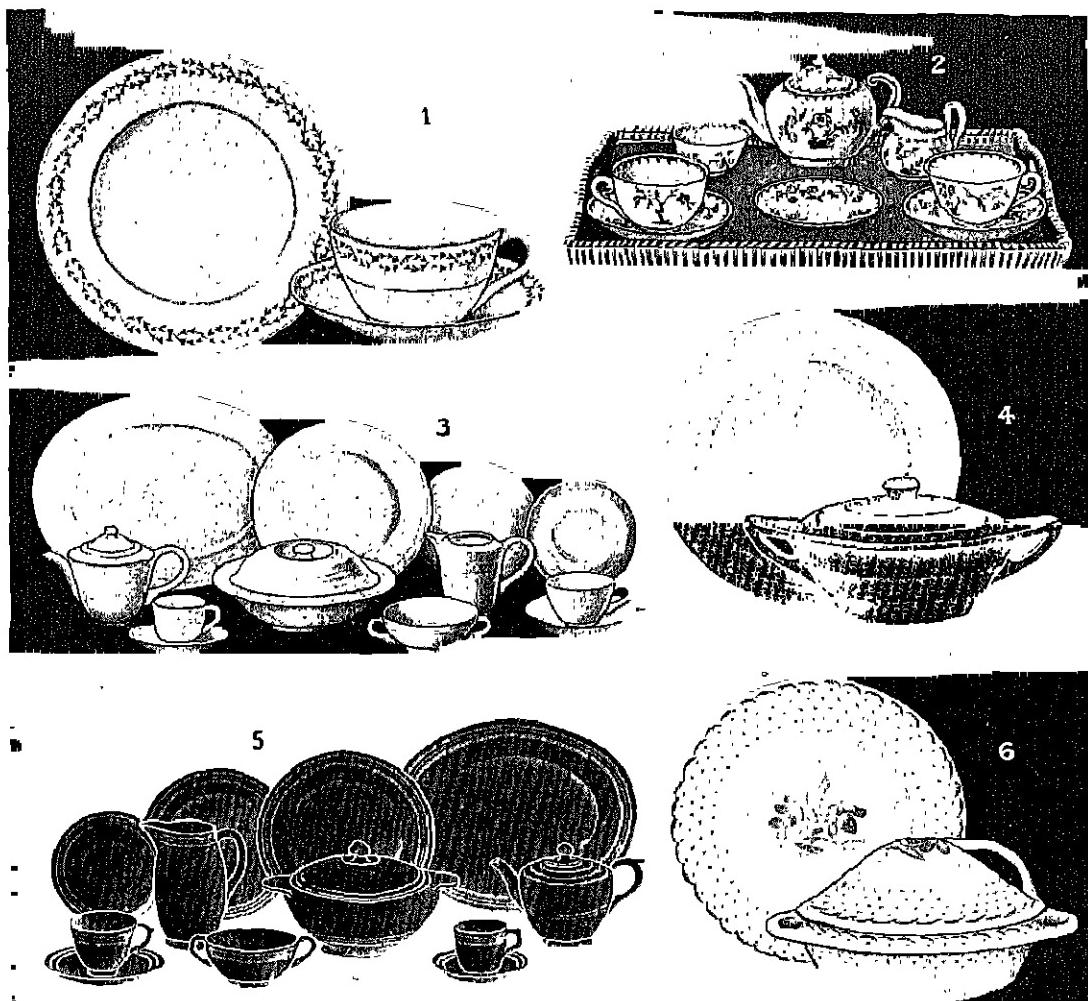


PLATE IV.—DECORATION OF CHINA AND EARTHENWARE
 (Class Picture No. 97 in the Portfolio.)

delightful little tea-set on a tray. With its evenly distributed spots of colour, the decoration, while producing an air of brightness and gaiety, breaks up and hides or camouflages the shapes. The response to this type of pattern might be—"Yes, yes, we know it's a tea-set. But we are not concerned with the shape of each piece; what we are worrying about is the appearance of our tea table. We want to create

a cheerful, bright atmosphere to which friends and visitors may respond, so that tea-time will be a pleasant break in the day's work." You will find that each example on the Class Picture suggests some particular mood—each set has a character of its own. Service No. 1 is refined; No. 3 is homely and comfortable; No. 4 is simple and dignified; No. 5 is clean and healthy, while No. 6 is pleasant and somewhat select.

V. CHOOSING A CUP AND SAUCER

Generally we should endeavour to make meal-times a complete break from the day's activities and, as the table becomes a centre round which we gather, let us make that centre as bright and attractive as we can. And it seems that here we have an opportunity for contrast. China with well-distributed and effective pattern, with clean joyous colour forming an opposite note to that of the general colour scheme of the room, will give our tea-table more interest.

But there is a subtler way of achieving the same sensation. That is by bringing the general colour scheme of a room up to a higher point of development and attraction. Let us suppose that our room is in a blue scheme. All the blues it contains will naturally be soft and quiet because we have to live with them. Now if we introduce into this quiet grey-blue scheme notes of pure, brighter blue, we carry our colour scheme a stage further and bring all the colour to a definite focus. Our tea-table offers this opportunity.

This is a natural development in any scheme of colour. The brightest notes should occur at the points of interest in the same way as we give the chief actor the centre of the stage at a critical part of the play. So we find that we need first of all some sort of general colour scheme in the arrangement of our furnishings. If our rooms are a medley of all sorts of colours, no particular notes are likely to have any effect.

On the examples of cups and saucers, Plate V, all decoration has been cleared so that the shapes can be examined. It will be seen at once that there are not more than half a dozen distinct shapes, but infinite variations on these shapes can be seen everywhere.

No. 2 in the centre top is the most ordinary and commonplace shape.

Nos. 1 and 3 are scalloped like shells, but in No. 1 the scalloping is both outside and inside, and the lines conflict and disturb. In No. 3 the scalloping is on a larger scale

and seems to distort the outline shape. Both Nos. 1 and 3 are single curve shapes.

Nos. 4, 5 and 6 are what we may call double bulge curves, which do not, in themselves, give a pleasing or satisfactory line.

No. 7 was taken from a Chinese egg-shell porcelain example. This is a very appropriate and simple shape, which is quite pleasing.

Nos. 8 and 9 have a slight outward flair and a definite stand at the base which gives more stability. Nos. 10, 11 and 12 are double curves, concave and convex. Nos. 10 and 11 have the concave curve above which gives a slight flair to the edge.

A slight curve in an outward direction is called a "flair." Most pouring vessels have a slight flair at the spout or lip which enables the liquid to flow easily by allowing an acceleration of flow at the very last second before it leaves the vessel. No. 12 has the concave curve below. All these prevailing shapes are standardised. They can be found in every china shop.

There is little variation in the saucers. Within narrow limits, the diameter alters slightly in proportion to the cup. The saucer also has the general shape and curve of the cup, and is sometimes deeper or shallower to give better proportion.

Now let us look at the handles. On No. 3 is a dotted line in a half circle running from one end of the saucer over the cup, to the other end of the saucer. The handle is, and should be, in such a position that it lies comfortably within that half circle. There it projects least and will stand less chance of being knocked or broken. Also it will be found as the best balanced position for holding, whether the cup is full or empty.

The feel of the handle is quite as important as its shape. No. 1 has a handle that is twisted and which reminds us of rope or string. This is surely an unfortunate suggestion in a part which demands stability. No. 2 handle is supposed to be stronger, which is doubtful, and the shape is not pleasing.

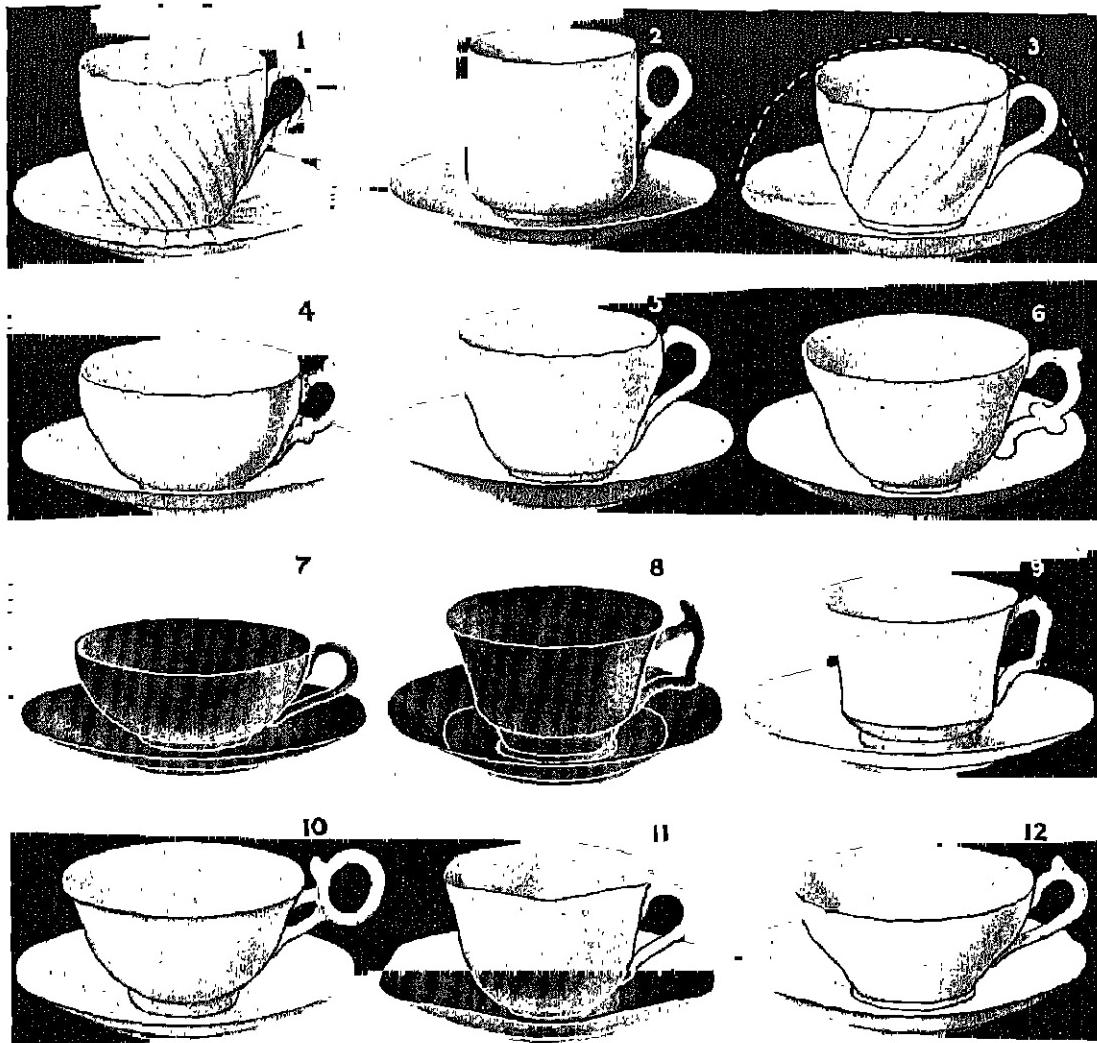


PLATE V.—CUPS AND SAUCERS
(Class Picture No. 98 in the Portfolio.)

Several of the other examples have projections. For instance, by comparing the handle of No. 8 with that of No. 9, it can be seen that the projection is quite unnecessary. It would obviously catch in things and get broken off. No. 10 is a bad handle; it projects too much, is ugly in shape and appears insecurely attached.

Having considered the chief features of these cups and saucers, we notice that in each case it is simplicity which counts most.

There are some people who want everything different, such as square cups and saucers, plates and dishes. It will probably be only a passing phase. They will find that things and shapes which have become established by use and custom are not fashioned by prejudice, but have a rightness and inevitableness, because generation after generation of craftsmen have followed natural laws and made each article to the best of their ability.

VI. TEAPOTS AND COFFEE POTS

One of the inventions which has caused considerable change during modern times is that of the internal combustion engine. Just as steam and the coming of railways caused the extension of towns, so the motor car and motor bus are causing towns to extend still further into the countryside. One result of this is very apparent to those who live in the country. Wherever we go we find tea gardens, tea-shops, and notices nailed up outside almost every cottage with the word TEAS. This great demand for and provision of teas is altering the shapes and styles of chinaware, including teapots.

A teapot should not be a difficult thing to design, for it has only four parts—body, lid, handle and spout. Once it is realised that there must be a complete unity between these four parts, the preparation of a design should be a simple matter. It is just like team work. If there are four individuals all pulling in different directions, one neutralises the other; but if they all pull together, they create some effect. Thus the parts of an article must work together and have a unity of purpose and aim; the lines must work together and flow freely; the shapes must have similarity and agreement, and the texture, surface and colour must harmonise with both line and shape.

The spout of a teapot is the most difficult part to design, for it is a projection and is therefore easily broken. A slight chip off the extreme end causes it to pour out badly. Instead of being a separate part attached to the body, it will need, if we are concerned with modern requirements, to be welded as part of the body.

Handles should be strongly and simply designed. Lids are now usually made with a deep flange inside so that they will keep in place even when the pot is tilted to an extreme angle. One important question that should be asked in connection with the lid is, "Is it of a sufficient size to allow the inside of the pot to be easily and comfortably cleaned?"

A teapot or coffee pot into which you cannot get your hand can never be clean inside.

Now let us turn to Plate VI. Nos. 1, 2, 3 and 5 are of metal, the first three, being coffee pots and the last a teapot. Notice the distinctive shapes of the coffee pots, for as both teapot and coffee pot may appear together on the breakfast table, there must be no danger of being unable to tell which is which. Roughly, one is tall and slender, and the other short and round. These three silver or silver-plated coffee pots are good in general shape and proportion, but one is struck by the fact that they consist of a number of parts put together. To a certain extent this is inevitable in metal and is made more apparent by the necessity for a non-conductor of heat for the handles. Metal handles would become too hot to hold comfortably, so ebony or ebonite is sometimes used instead. The method of attaching the ebonite to the metal, however, is seldom satisfactory, and when the top part of the handle is joined to a flat collar or flange, it never appears safe, even though we may know it is quite secure. If a thing looks uncomfortable or unconvincing it should be avoided. See Nos. 1 and 5 on the Plate.

The tendency in design to-day is towards angularity. One result of this is that these angles make things more difficult to clean and, what is more important to our consideration of beauty, they become curious mixtures of straights and curves, such as No. 2.

No. 4 is the common brown cottage teapot, but in this case there is a disparity between the spout and the handle. The handle seems much too slender to support the weight.

We wonder why it is that when people make a fantastic shape they put an imitation Chinese pattern on it, calling it a "Chinese design," as we find in No. 6.

No. 8 is quite consistent in shape and design, and is evidently not intended for a large tea party, but for two people only.

No. 7 looks more like a bathroom or



PLATE VI.—TEAPOTS AND COFFEE POTS
(Class Picture No. 99 in the Portfolio.)

dental surgery fitting than something to grace a tea-table, while No. 9 allows no space for fingers and we doubt whether it would pour out properly. But although at first sight we may not like these lines, it is on this pattern that the teapot, to suit modern needs and conditions, must develop.

The last three examples on the Plate are "Moorcroft Powder Blue Ware"; they are strong, well designed and shapely. Perhaps

they are a trifle heavy in appearance, but the colour chosen for these articles is the one colour that will correct any heaviness. This powder blue is a very atmospheric colour and so makes things appear less near and objective; it recedes and so puts objects further away from the eye, and that has the effect of reducing solidity and weight. This is an excellent example of the way in which form can be modified by colour.

VII. POTS, KETTLES AND PANS

In the middle of the upper part of the Plate are illustrated two articles that have made cleaning very much easier work; No. 4 is a carpet sweeper and No. 5 an electric vacuum cleaner.

Not many years ago the principal cleaners used in the home were brushes and a feather duster. Hard or soft brushes, with long or short handles, were used vigorously, stirring up clouds of dust. After that the feather duster was flicked lightly over shelves, ornaments, curtains and hangings, and the whole atmosphere of a room was filled with particles of dust. Naturally, most of this dust eventually settled, only to be disturbed in the same way the next morning. This dust was breathed into the lungs, it settled on food and everything else, and was never really got rid of—an altogether stupid and unhealthy way of doing things. Nowadays the dirt is forced out of the carpets, hangings and furnishings, and taken away.

No. 4, the carpet sweeper, has two spiral brushes which revolve as the wheels are pushed across the carpet. The dust is brushed directly into the box, which is easily emptied. For all light work these are efficient and necessary articles.

The vacuum cleaner, No. 5, is a more powerful worker altogether. It thoroughly sucks the dirt out of carpets and textiles by means of a revolving fan run by a small electric motor. There are all sorts of attachments for getting into corners and sucking up the dirt from out-of-the-way places. A vacuum cleaner has become an indispensable article in a great many homes.

Now let us turn to our pots, kettles and pans. In a really up-to-date kitchen one sees little more than a number of cupboard doors. Everything is put away in its place. The children can prepare a list of the various articles in use in a large, modern kitchen. There are all sorts of saucepans, of varying sizes and shapes—preserving pans, fish kettles, fish fryers, stewpans, and porringers or double saucepans for heating milk. These

are made of metal—aluminium, copper or iron. Copper stewpans are used for fruit, because copper is not affected by the juice. Many saucepans and steamers are made of aluminium which is light to handle, durable, and requires less heat for cooking.

There are kettles of many sizes and shapes, kettles that whistle when they boil, quick boiling kettles, some in enamelled iron, most in aluminium and still a few made in brass or copper.

There are casserole dishes made of earthenware with their quaint stumpy handles, or having glazed covers and a flat handle at each end.

There are all sorts of bowls, pie dishes, and pudding basins; earthenware jugs of unusual shape, and jars, large and small. The big ones with lids are used for storing cereals and other food products.

There are fireproof oven-glass dishes in which to cook bread, cakes and pies, or to stew or casserole. All these are of good shape and appearance, so that they can be used both to cook the food in and to serve at table.

The children should be led to notice that there is a clear-cut division between the things used for cooking, and the articles used for serving. We look for something finer on our tables than in the kitchen; articles daintier, more elegant, and more showy.

This brings us to the final question of our talk. Are the ordinary cooking vessels ugly? Are the serving vessels more beautiful than the pots, kettles and pans? If so, just where does the difference lie? The children should try to decide these questions for themselves.

There is another aspect of beauty that should be pointed out to the children, that is the interest of groups of objects. In most of these talks we go from one article to another and look at each individually. But in the kitchen, for instance, when work is going on, we get all sorts of utensils and articles grouped together on dresser, table, or about the room. We want the children

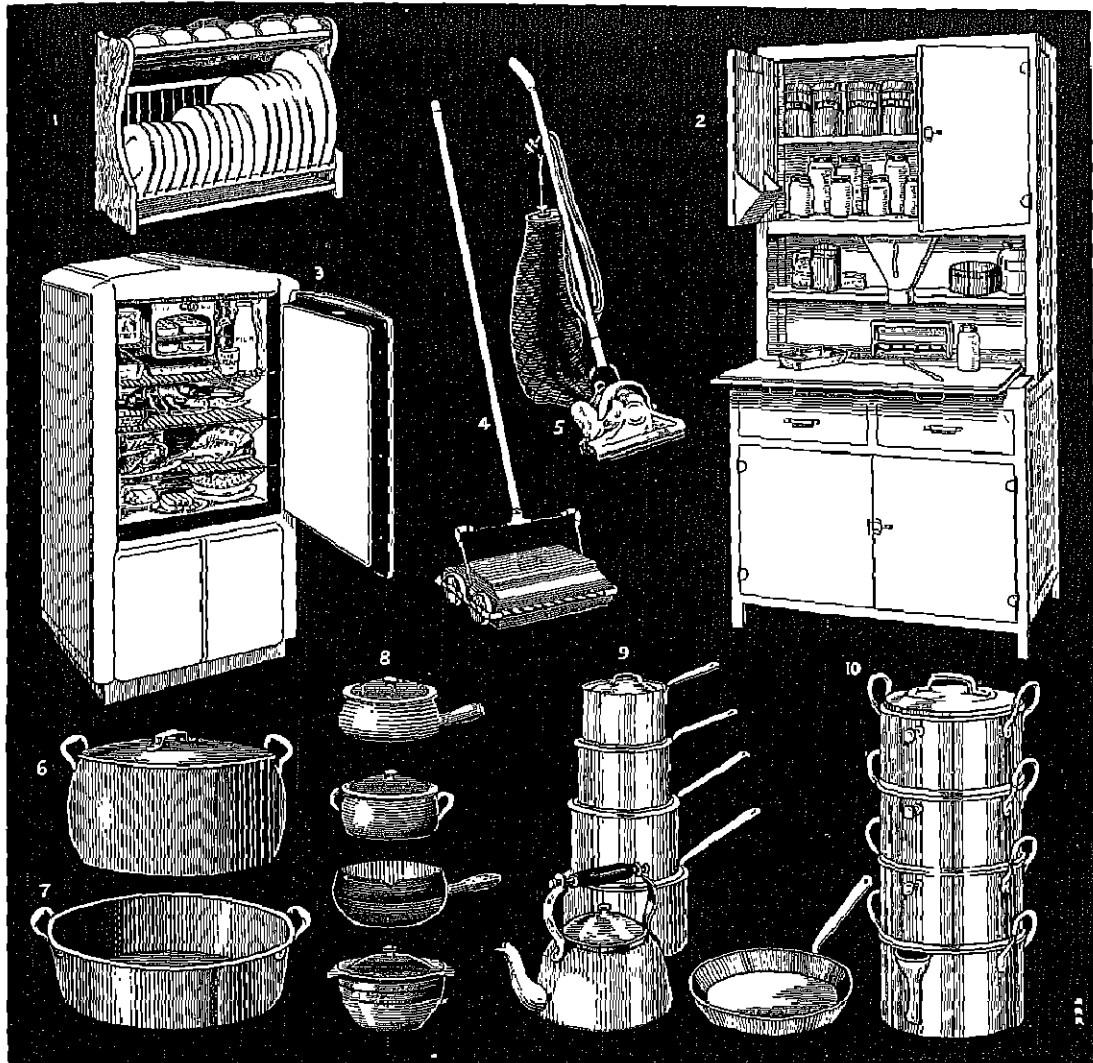


PLATE VII.—POTS, KETTLES AND PANS
(Class Picture No. 100 in the Portfolio.)

to notice these groups, for artists of all periods have loved to paint such subjects. It is quite easy to get into the habit of looking at things as separate objects and forgetting that they also have relation to their surroundings. A few saucepans placed one on top of another, as in the Plate, have a cumulative effect which gives them an entirely different appearance. The steamer produces something of the same feeling.

From a purely aesthetic point of view, we should say that there is nothing ugly about the cooking vessels and only a slight difference between them and the serving vessels. That difference is largely due to the craftsmanship and the material. It is obviously not fair to contrast the tin saucepan (machine made by mass-production methods) with silver ware produced by highly skilled craftsmen.

VIII. KNIVES, FORKS AND SPOONS

Knives, forks and spoons are implements which have been fashioned by generation after generation of craftsmen, until it really seems as though, by a process of elimination, they have reached the limits of simplicity in design. As simplicity in design is one of the qualities of beauty, these articles are excellent examples to study.

Naturally, there is a desire to be up-to-date even with highly standardised things, and the present fashion in design is one that appears to have been the outcome of a new invention—the radio receiver—which has spread to our furniture and utensils.



PATTERN OF KNIFE HANDLE

Here is a knife handle in this style.

In talk No. 2, on Proportion, it was shown that ratios of all kinds appeal to the eye, as instanced in a ladder-back chair and a chest of drawers. This design of a knife handle has a ratio rather like that of the Windsor arm chair. It is a simple and pleasing way of relieving a rectangular shape. But we are not at all sure that this knife would be comfortable to handle. On gripping the handle to cut anything, there are four sharp ridges (marked on the diagram) which press into the palm of the hand. Made in metal, these sharp corners would take years to get rounded off. A housewife, quite reasonably, objects to unnecessary corners and edges on utensils of any kind. If they do nothing else, they soon wear out dish cloths, wiping and polishing cloths.

On all the other handles illustrated on the Plate there is nowhere a sharp point or ridge, with the exception of the fiddle pattern spoon, No. 30, and it is for that reason that we prefer the Old English design above it, No. 29, which is a beautiful shape.

In No. 8 the curve of the blade, called

pistol pattern, is repeated in the handle. A curved handle could similarly be applied with good effect to No. 5, while No. 2 could equally well have a curved blade like No. 8.

Knives were not placed on the table till the early sixteenth century, diners being expected to carry on their persons such knives as they might require.

With carving knives of all kinds it is highly important that the handle should have a surface which gives a good grip. There is no particular reason why they should be exactly like the table knives. It is best to choose the things that are the safest and most comfortable for the purpose for which they are intended.

Spoons were introduced from Italy in the reign of James I. Old English (No. 29), fiddle (No. 30) and rat tail (No. 31) are the simplest and most satisfactory shapes.

There are many people who believe that if articles are fashioned and made entirely for their purpose, beauty can be ignored or dispensed with; or at the most, beauty is a later addition, which does not affect the purpose and use of the article in any way. In the middle near the top of the Plate is illustrated a small wooden spoon (No. 15) and a silver salt spoon, No. 16. These are drawn the same size as the originals, but the drawing of the silver spoon gives only a general idea and hardly makes one realise the sheer beauty of the design. The back is even finer than the front, the bowl being a delightfully worked shell-shape. The design is the work of one of our great traditional English craftsmen-silversmiths, and has his initials on the back. The wooden spoon is the kind supplied by ice cream vendors. Two tiny objects, both for a similar purpose, but what worlds apart!

There seems also to be a general idea that beauty means decoration, but beauty lies much more in line, shape and proportion. These are factors in the actual construction of an article and not something put on to

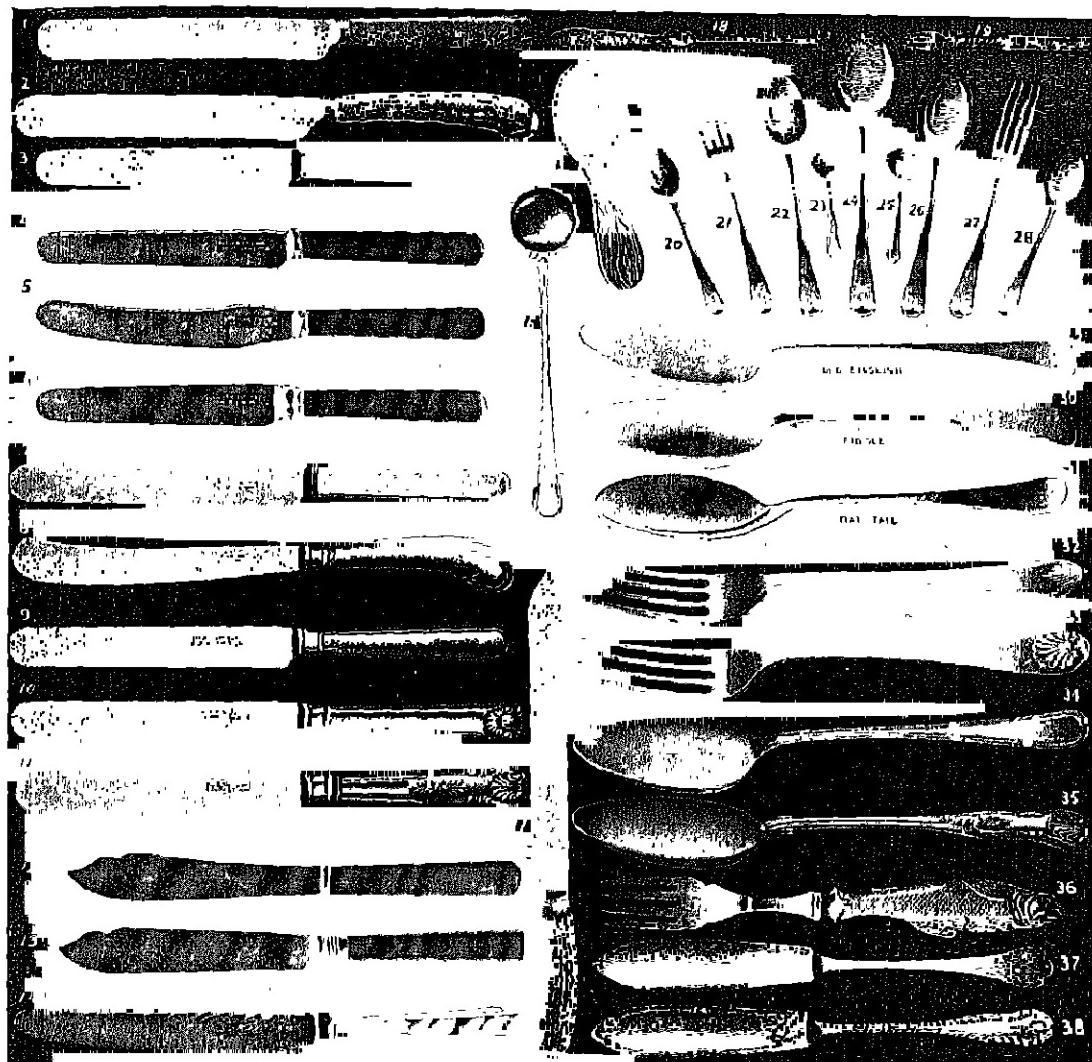


PLATE VIII.—KNIVES, FORKS AND SPOONS
(Class Picture No. 101 in the Portfolio.)

make it look nice. Further, beauty is not something separate and distinct from purpose and use, but the logical and inevitable continuation of the process of utility.

There are other mistaken ideas on this point. One is that because a particular shape is in general use, it has become commonplace and therefore is not so beautiful as something of a like nature that is more ornamental and decorated. An article is

not less beautiful because everybody uses it. Take for example the Old English and fiddle-shaped spoons that were mentioned earlier. These are the final product of countless generations of craftsmen—the perfection of simplicity in design. Nothing can be added to or taken away from these designs without losing this perfection. Nor are the more ornamented and highly decorated articles likely to be more beautiful.

IX. GLASSWARE

Ornamental and table glass is roughly speaking of two kinds—glass and crystal. These two materials are similar, but each has a separate character. Glass is much softer, and in its heated state is more plastic and flowing. It can be blown out in large bubbles at the end of a tube, or modelled, twisted and shaped. That bubble-like fragility is the peculiar quality of glass alone. Crystal is hard, perfectly clear and luminous; much more jewel-like than glass. It is adapted for cutting and polishing, so producing many refracting surfaces.

The best things are those which show off the essential qualities of the material, so in glass we should expect to find smooth bulb-like shapes and flowing lines, and the less ornament there is to distract the attention the more we shall be aware of the line and shape. With crystal we should expect heavier and more solid articles, as they must have sufficient thickness to cut into.

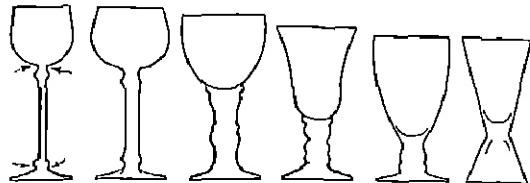
Commercially, these two materials tend to lose their individual character; they imitate each other in style, and the material is often a mixture of glass and crystal.

Plate IX is divided in two. At the top of the section on plain glass are five wine glasses. Their varying size indicates to some extent the rarity and value of wines or liqueurs they are to contain.

As the nature of glass is fragile, we should learn where to look for weak spots in order to avoid breakages. Wine glasses with very slender stems should be avoided. In a material so clear and ethereal, quite reasonable thickness can be allowed everywhere.

The drawing above shows a transition from dangerous fragility to more solid stability. Some modern cocktail glasses are made much on the lines of the last example; yet they have little appearance of clumsiness or heaviness, and are essentially drinking vessels and not intended for serving ice-cream.

Each of the four jugs on the left of Plate IX has a distinctive character. One has a



SHAPES OF WINE GLASSES

full round comfortable shape, consistent throughout the design. The next to it is more upright and dignified. Following that is one more elegant and classical in appearance; and the last is less formal and symmetrical, with slightly flattened vertical planes. These are all well designed.

The goblet at the bottom is in shape something like a wineglass with a short stem, and something between the wineglass and tumbler in size. The decanter is very slightly cut and shaped in vertical planes. The cutting is consistently simple throughout. The last is a glass mug.

On the other side of the Plate bad cut glass is illustrated. It must not be supposed that all plain glass is good and all cut glass is bad, for that certainly is not the case, although there is in our shops to-day much imitation cut crystal which shows clearly the worse faults of this kind of ware.

At its worst cut crystal is massive and opulent. By its surface scintillation and glitter it distracts the eye from the underlying form, which is often mean and uninventive in shape, and bad in line and contour. At its best cut glass produces extremely beautiful articles which delight and exhilarate by sheer brilliance and sparkle.

The imitations are frequently only moulded glass. Molten glass is run into clay moulds or pressed into shape in a power press. That is, it is a commercial method of imitating a better article, easily and quickly done on large-scale production and with little of the quality of the original.

Looking over the shapes it will be seen that the cut glass is heavy and cumber-



Examples of good plain glass.

PLATE IX.—GLASSWARE
(Class Picture No. 102 in the Portfolio.)

some, while the cutting in most cases is little more than a trellis work of cross lines, a monotonous and mechanical breaking up of the surface into squares or diamond shapes.

Two of the jugs are clumsy and heavy and the cutting is a mechanical crossing of lines. The other two are badly shaped and the decoration does nothing to help them.

The vase appears to be of a ware which

was very prevalent a few years ago. Most of it was sand-blasted.

The glass dish is less mechanical in cutting, but as the entire surface has been cut up there is no relief or rest for the eye.

The two vases at the bottom have been moulded and afterwards recut and polished. They are rather better commercial products, but lacking in design and craftsmanship.

XI. TABLES

Although a table is such a simple object—just four legs and a flat top—a great deal of ingenuity has been utilised in its design and fine craftsmanship has gone to its making. At first tables were movable boards set upon trestles, and it was not until the days of the Stuarts that tables were built as permanent structures. The Jacobean refectory tables were frequently of great length, some even thirty feet or more, but narrow in comparison. The gate-legged table is also of this period, and has been found so practical and useful that in one form or another it has persisted down to our own day. The draw-leaf table is not a modern invention, but one that originated about the same period as the two previous examples. Thus all three types of modern table are derived from Jacobean times—there is comparatively little surviving furniture that is earlier than 1600.

When choosing a table, see that it is sufficiently firm and substantial for everyday use; that the parts slide easily, and that the construction is sound enough to prevent warping or shrinking. A panelled table top is generally strong, for the grain in the framework runs in an opposite direction to that of the panel and so makes for strength and durability. In some cases those lines on the top surface which look like panels are put there only for decoration and are not part of the construction.

No. 1 on the Plate is not symmetrical; the legs are not upright, the drawer is on the slant and the whole article has a cant to the right. This table has been included because some people believe that irregularity is a proof of age and this is the sort of thing they look for in old furniture. It is not necessarily any kind of proof, and a thing that is twisted and distorted is uncomfortable to look at and live with; so if possible it should be put right. A piece that is of genuine antiquity does not lose by being made symmetrical. Distortion usually suggests rough usage, and that is an uncom-

fortable feeling, particularly when associated with age.

Nos. 4, 7 and 8 are also period pieces. No. 4 was included to show how tables could be shaped and decorated with dignity and refinement. There is one feature about its cabriole legs that has not been previously mentioned, that is, the claw and ball foot, which is shown separately at No. 5. It is an instance of the skill, care and craftsmanship shown in details. This ball and claw motif terminating the legs of chairs, sideboards, settees, etc., occurs in other periods after Queen Anne's time.

No. 7 is a James II side table, which means that it is usually stood against a wall. It has a drawer as most of these side tables had. Compare the legs of Nos. 7, 8 and 9.

No. 9 is a plain hexagonal upright, with only four turned indentations on the centre pedestal at each end—a plain, simple-shaped leg. No. 8 is baluster turned, with the square left at the top and near the floor to make secure points for the table frame and stretcher. The turned part breaks the surface with a number of sparkling little lights which help considerably to give a feeling of lighter construction. No. 7 with its twisted barley-sugar turning has the same effect on a larger scale. Glance from No. 7 to No. 9 and see how severe the latter looks, and how bright and sparkling No. 7 looks in comparison.

No. 8 is an old gate-legged table. As we have sat at one exactly like this for thirty years, we can guarantee it as being satisfactory in every way. Six people can sit at this table in comfort, and every evening one leaf is closed down and the table is moved so that we can see to work.

Of the more modern examples on the Class Picture, the legs of No. 9 have already been considered. The table is a simplification of the older gate-legged. There are only six legs, where the old ones had eight, and it opens out to a rather longer and narrower

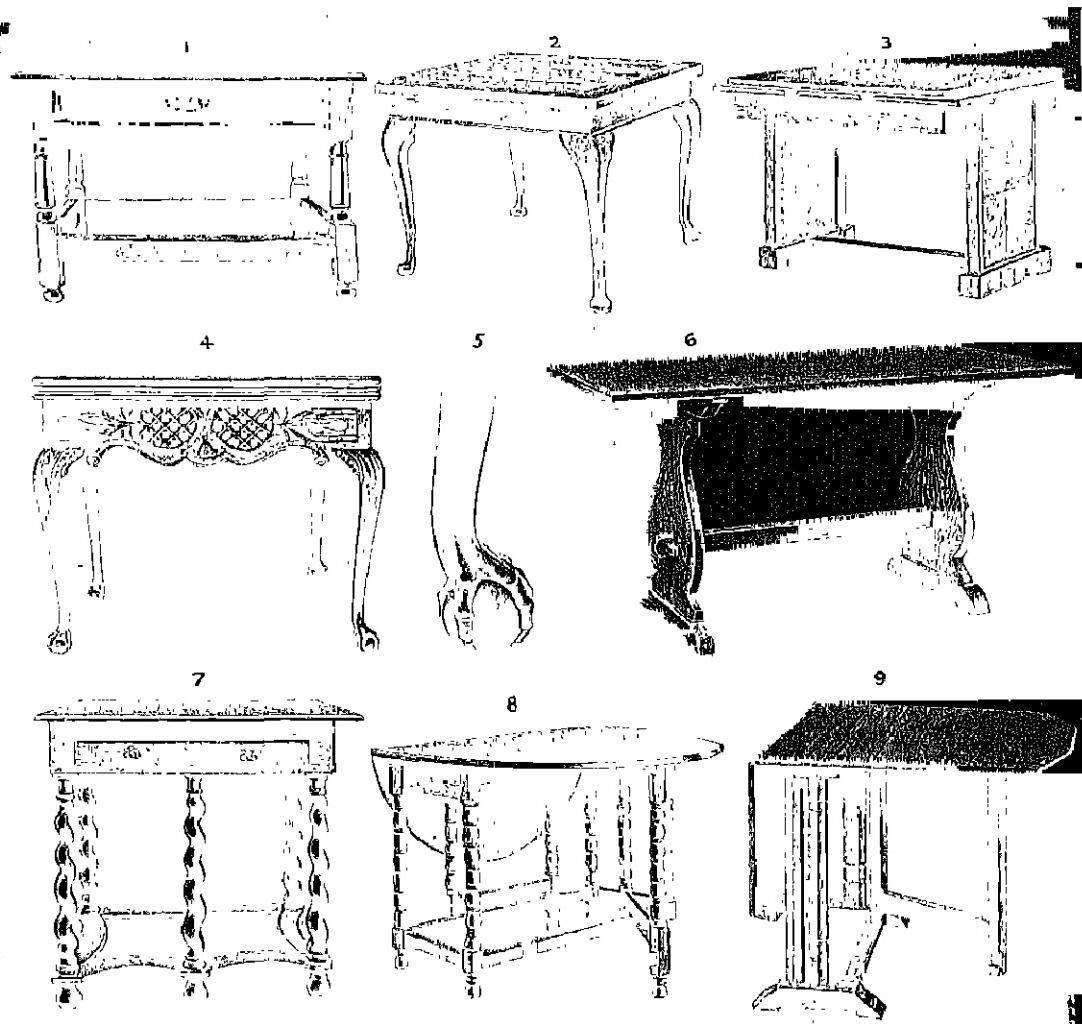


PLATE XI.—TABLES
(Class Picture No. 104 in the Portfolio.)

rectangular table with the corners cut off instead of being oval in shape.

No. 6 is a refectory table, and however modern the example may be, it still has something of the air of a monastery and whispers of monks and fasts and penitences. It is a stout and useful table for the modern home.

No. 2, a draw leaf table, is an elegant piece of furniture, excellent in every way,

but it might mean that the chairs to go with it would also need to have cabriole legs, and it would be necessary to consider whether that would be suitable with the other furniture in the room. For No. 3, another draw leaf table, we cannot pretend to have much use. The space between the legs being filled with plywood gives a false effect of massiveness, where one's knees would be grateful for the space.

XII. CABINETS AND SIDEBOARDS

The modern tendency is to build small houses and flats with plenty of built-in cupboards, so that furnishing can be reduced to a minimum. In one or more bedrooms, however, wardrobes are still required. These have become in recent years extremely simple pieces of furniture—plain, rectangular boxes with perhaps a slightly curved top or a bow front. All useless ornament has been discarded; surfaces are smooth and plain, without panels, recesses or mouldings to collect dust. However well arranged the interior, the outside achieves a Spartan restraint and simplicity. With simple shape and good proportion, the only other factor necessary is beautiful material; and that is offered in a profusion of rare woods from all parts of the world. No period has ever had before in general use such surfaces and textures. The illustration of the wardrobe on Plate XII is a really beautiful piece of furniture in the prevailing style, a style perfectly suited to a democratic age which needs plain simple things for work-a-day people. It is evident that there are as fine craftsmen to-day as at any period.

The arrogance and display of the costume period has disappeared. Straightforward simplicity is the keynote which expresses the good taste of modern times. New styles do not occur haphazard. They are produced principally by changes in our mode of living and by new materials.

The most important new material is plywood. The revolution it has produced in our furniture and in our homes is greater than that caused by the introduction during the Carolean period of veneer with its attendant inlay and marquetry.

The first three sideboards illustrated are all simple in design and construction, but each is distinctive. The distinction lies in the proportions. In No. 2 the containing or outline shape is well proportioned and is raised on a framework extending slightly beyond each edge and supporting it adequately and comfortably.

No. 1 is very simple and yet complete. The stand and body are one, while the main part is divided into three drawers and two cupboards; a useful, unassuming and comfortable piece of furniture to live with.

No. 3 is not quite so plain; the straightness and squareness are modified with slight curves, a bow front and cabriole legs. The inlay adds variety to the surface.

In No. 5 the stand is splendidly designed to carry and support the cabinet. The soft flow of the curves from the floor upwards is like a plant growth. This is a lovely transition from the slender legs up to the cabinet itself with its slightly bowed front and curved sides. Its elegance alone is sufficient to separate it from our own time to a period more fanciful and gentle mannered.

No. 4 is a bad example of a sideboard which has very heavy ornamentation, highly rounded panels and fantastic decoration in half circles which not only neutralises all proportions but actually runs across one end of each drawer, so that whenever a drawer is opened the ornamental scheme ceases to exist until the drawer is shut again.

The other sideboard (No. 6) has its surface broken up in every possible way. The cupboard doors have square panels of lighter wood placed diagonally across them; the horizontal bars above and below the cupboards and the upright supports are all rounded and that effect is intensified by coating them with dark varnish and then rubbing it away in places, to give the effect of a rounded surface. A great deal of this effect aims at an appearance of massive solidity, which is quite unnecessary, and unlikely in a piece of furniture of this kind. It also has bad handles and ungainly feet.

No. 7 has some resemblance to a bathing tent. Not at all an object one would wish to see when one first wakes each morning. How much more soothing is the simplicity of No. 9! The pattern of the grain of the wood is most pleasing.

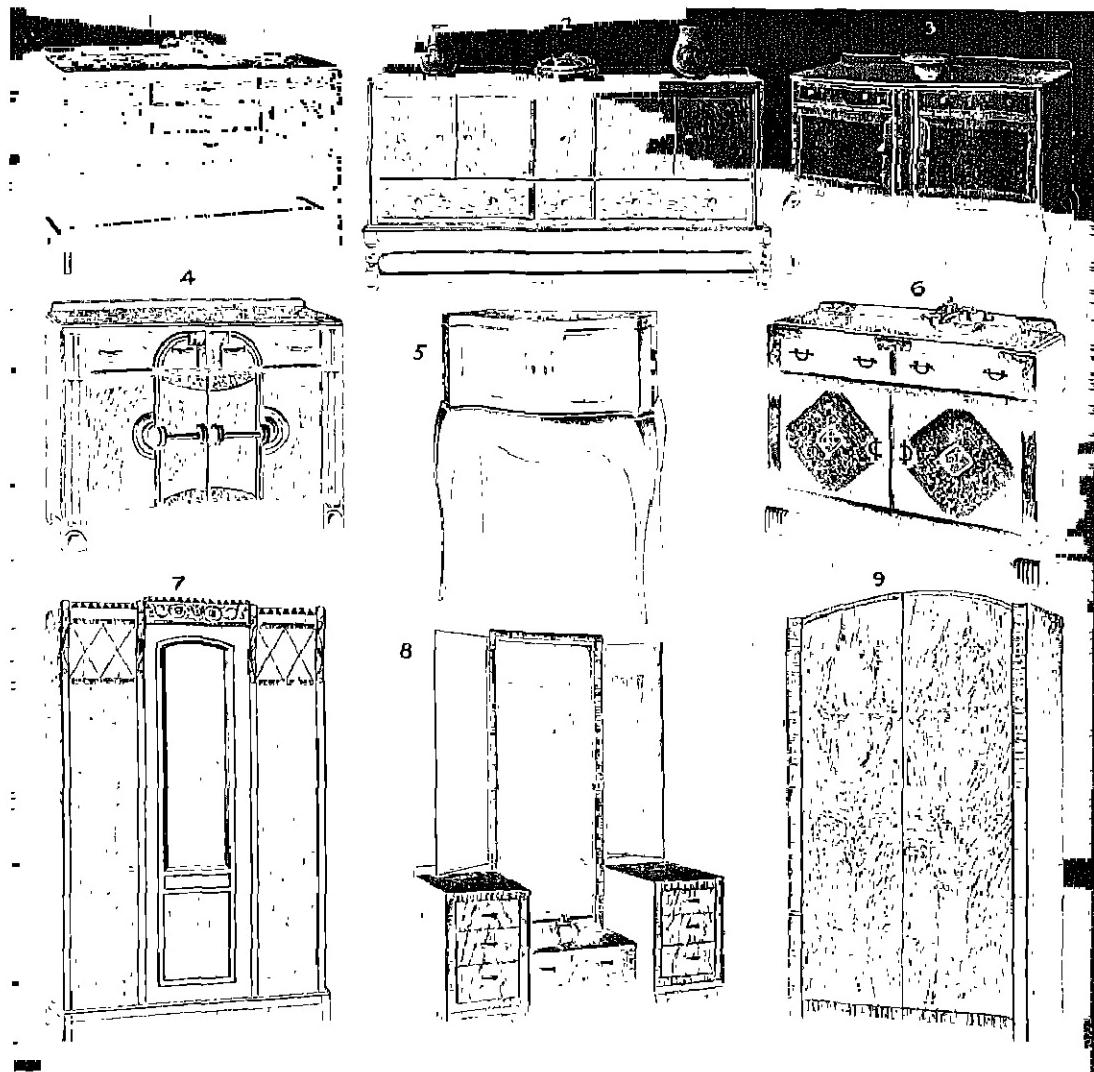


PLATE XII.—CABINETS AND SIDEBOARDS
(Class Picture No. 105 in the Portfolio.)

No. 8 is an elegant modern piece, dignified, well proportioned and arranged. The central mirror is pivoted to tilt in its frame, while the two side ones are hinged to swing. It has little cabinets of three drawers on each side, while the larger centre drawer is set back to allow more foot space when sitting before the mirror. Notice particularly the way in which the blocks on which the cabinets rest are stepped back to keep

them out of the way. One should always look at the feet of furniture. Avoid those that are ugly and noticeable and especially if they project in such a way that one would be sure to stub one's toes against them. This dressing table is a very satisfying piece of furniture. In spite of its squareness it has lightness and elegance, and forms an appropriate reflector for daintiness and charm.

XIII. BOOKCASES AND BOOKS

The two fancy-shaped bookshelves, Nos. 1 and 3 on the Plate, formerly appeared in almost every room in the house, possibly in the company of the one at the top centre. They are still to be found in many seaside boarding houses with the oddest assortment of volumes, together with the queerest-shaped vases. The bookcases are generally attached to the wall by tiny brackets and two nails, so that if one is not careful when selecting a book, down comes the whole thing, disclosing a patch of discoloured wall paper. Flower vases and books are things better kept separate—that is if one values the books.

The so-called ornamental shape of these wall bookshelves gave them the odd effect of amateur fretwork, so that they did not agree with anything else in the room, except perhaps with the overmantel, and now that has gone these wall brackets should disappear too.

Nos. 4, 5 and 6, are plain and simple book cabinets—neat, attractive and without ornament. Their aesthetic interest comes from proportions and the nature of the wood. Notice particularly how carefully the pattern of the wood grain has been selected and arranged on the larger panels. Where the thickness of the wood is shown, and on the long narrow edge sections, the grain is put crossways, so that instead of a long flat edge, there is a patterned surface. These cabinets, with a slightly toned surface of plain wood, make an ideal foil and setting for the rich colours of the bookbindings. Although the outline shapes are simple, the eye travels from one end to the other and everywhere finds something to interest and delight.

We come to the unit system of bookcase, No. 7. These units can be bought separately so that as the library grows the bookcase is built up to contain it. The units are made in different lengths, heights and depths, and each unit has two glass doors which slide along in metal grooves. This arrangement enables books to be kept free from dust and in proper order.

The idea of units is so convenient and so well adapted to modern conditions that there are many firms producing them, and each firm has its special methods and features. Books should be kept under cover in order to save endless dusting. The glass fronts allow one to look along the shelves and see all the volumes without opening the cabinet. The trouble with hinged doors is that thin books are often hidden by the door frame, so one is obliged to open the doors to see if they have been covered in that way.

Ingenious methods are used in some cases for sliding the glass temporarily out of the way. Simplicity and cheapness of construction are combined to provide units at a reasonable cost and at the same time give every convenience with an attractive appearance.

The illustration gives a good idea of the way in which these units can be built up and help to furnish a room. By alternating between cupboards and bookshelves, one gets a maximum variety without disturbing the general unity of the scheme. A long bare wall with one or two of these cabinets in position immediately becomes of interest, while very little floor space has been occupied. The steps made by the varying heights can be made to lead the eye in whatever direction is desired.

It is from this variation of height that the idea of steps has invaded a good deal of modern furniture. It relieves the boxlike structure in a simple and agreeable way and makes the rooms less formal and conventional, while it retains the essentially architectural character which should be a feature of all furniture and furnishing. By an architectural character is meant that the things are four square, solid and having the appearance of being built-in as a part of the room. They have a permanent character, while the fancy and ornamental things have a temporary character. The one is durable and lasting; the other is passing and impermanent.

Turning from this bookcase No. 7 to No. 2 (an Empire bookcase with open

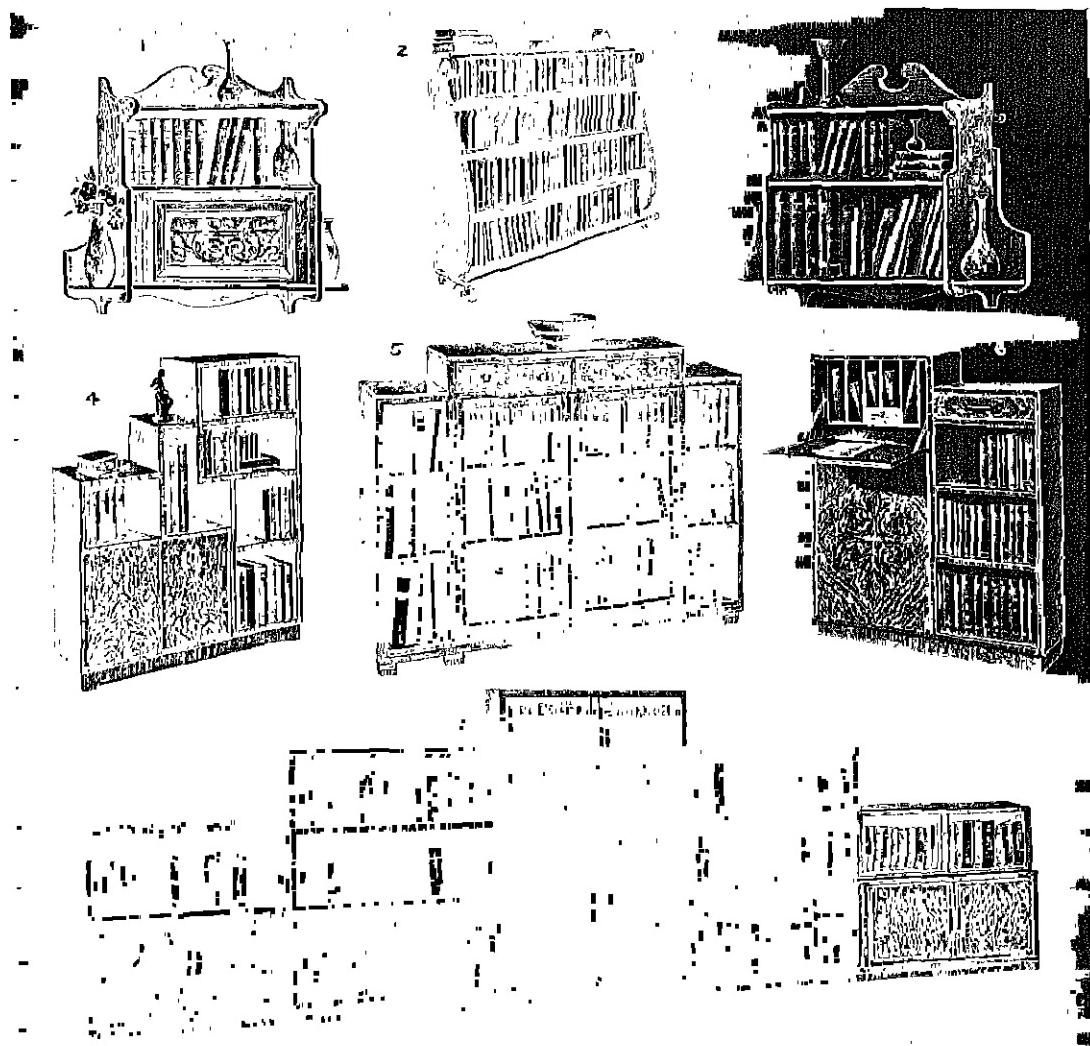


PLATE XIII.—BOOKCASES AND BOOKS
(Class Picture No. 106 in the Portfolio.)

shelves) it will be seen that one has only to take out a few books from one of these long shelves to have all the rest lying at angles.

When discussing with the children Class Picture No. 106, point out that Nos. 1 and 3 have no real design, but are flimsy and ornamental; difficult to fix securely on a wall, and at best makeshift arrangements for holding books, with unnecessary brackets for flower vases.

In contrast with these, it will be a simple matter to show the architectural design and construction of Nos. 4 to 7. Show the children how they are kept quite simple in outline shape and interior arrangement, with an eye to proportion and balance all through, and how their chief effect comes from the material itself—the grain of beautiful wood, kept either in its natural colour or slightly stained to bring out the pattern more clearly.

XIV. TYPE, PRINTING AND LETTERING

So far in this series of talks we have been concerned with the things *in* the home; we now propose to consider some of the outside influences which *come in*. Of all these outside influences printing is probably the chief. Consider what an enormous amount of printed matter one sees in a year, or even in a week—newspapers, books, journals, advertisements, catalogues, leaflets, notices and so on without end. These things cannot fail to influence us in some way, and it is as well to understand them and their relation to our daily lives. All these things have their good and bad features. We can sort them in our minds and determine which is which. If a principle is really a principle it can be applied consistently through a great variety of subjects, hence we continue to apply our basic principles—line, proportion, colour—to see where they lead us.

A principle is not a yard stick to measure by, as one measures off cloth by the yard; it is a Golden Rule for guidance. In the consideration of printed matter it is necessary to exercise our sense of proportion. On the one hand we have printed things of the moment; passing things that interest for a short time and then are done with. On the other hand we have the enduring things, great works which are more or less permanent.

As these have entirely different functions and purpose, they differ in character, and that is where our sense of proportion has to be exercised in order to estimate them. We do not expect a newspaper to be printed as well as an art journal, or even an ordinary book. The momentary and passing things are good enough for their purpose, and we are well supplied with them.

In any lettering, whether printed or drawn, it is most essential that it should be easily read. Thus, it is very necessary to see that lettering is well shaped, well designed, and founded on a good alphabet.

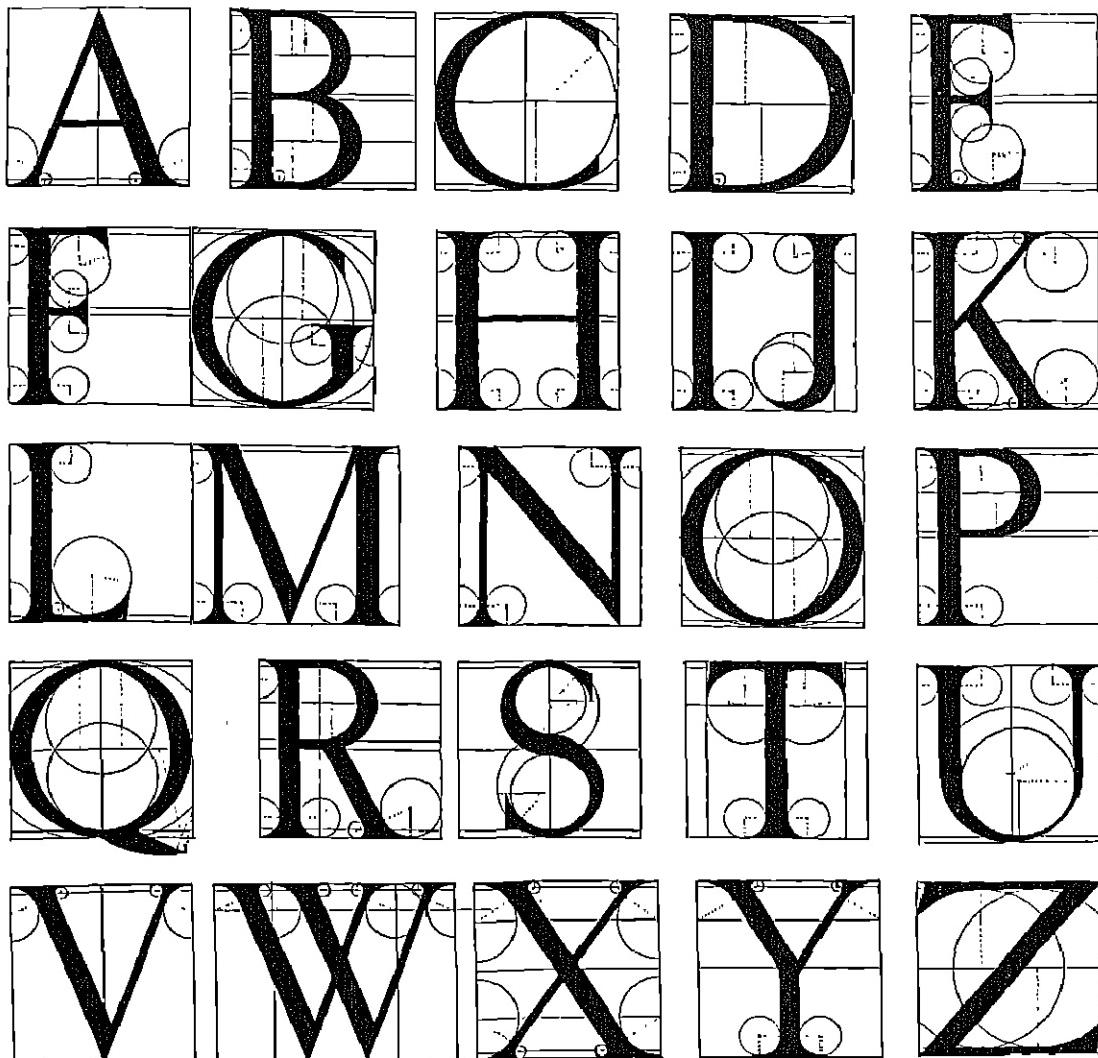
The English alphabet in use to-day is derived from the Romans. In most respects

it contains the same letters as can be found on Roman inscriptions in Great Britain and on the Continent. This alphabet, by its boldness and mathematical proportion, is an ideal one for inscription on stone, and its use for this purpose crystallised its form to one of absolute simplicity, directness and intelligibility. Here is a splendid standard, which has remained constant over several centuries. It is to the simplicity and mathematical proportion of this alphabet that we particularly wish to draw your attention.

To most people an alphabet is something that has grown with the race, been added to here and there and altered to suit conditions. That, however, is not the case. However a thing may develop in its early stages, usually there comes a time when some individual, a great man, refashions it to make a complete and satisfying thing which will last for centuries after.

That is what happened to our alphabet. In 1525 Albert Dürer, one of the world's great artists, produced an alphabet simple in construction which can be readily reconstructed by mechanical methods. This alphabet was in turn derived from the inscription on the Trajan Column. From Albert Dürer these two alphabets, *Roman Capitals* (Class Picture No. 107) and *Lower Case and Numerals* (Class Picture 108), have been designed and drawn by Leslie Badham, R.I., R.B.A. By following the guide lines on these Class Pictures anyone with a pair of compasses, a rule and a set square should be able to reproduce these letters exactly.

Each letter is composed within a square, and every part and every circle used in the construction bears some relation in proportion to the square. No attempt has been made to keep slavishly each letter strictly to the square space—B, E, F, K, I, J, P, R, S, T, each occupy little more than half the square. M and W have rather more



[Designed by Leslie Batham, R.I., R.B.A.]

PLATE XIV. A.—TYPE, PRINTING AND LETTERING—CAPITALS
(Class Picture No. 107 in the Portfolio.)

than a square. This has been done for the sake of due proportion.

Each letter was drawn in a square of $3\frac{1}{8}$ in.; that is $\frac{27}{8}$ in. Each thick stroke is $\frac{1}{2}$ of the square = $\frac{3}{8}$ in., and the thin strokes $\frac{1}{3}$ of the thick strokes = $\frac{1}{6}$ in. Every radius used is some proportion of the square.

On both Class Pictures this construction is clearly shown. In capital letters which

have a central horizontal stroke—B, E, F, H, P, R—the thickness of this is measured from the centre of the square upward, so that the stroke comes just above the centre to give the upper part rather lighter weight than the lower part. The centre of the S is also above the centre line for a like purpose. Note that the W is two V's and occupies a square and a half.

452 TEACHING IN PRACTICE FOR SENIORS

The lower case letters and numerals on Class Picture No. 108 may appear complicated, but as all the working construction is clearly shown it will be found much simpler than it looks.

The essential features of these two alphabets is that being built on a strictly geometric and mathematical basis, with all the parts of each letter related in size and proportion to the square that contains it, there is a uniformity which has ample variation and a consequent rhythm that delights the eye. That rhythm is carried on and completed by the spacing between the letters. Here there is no guide and one must trust to the eye alone. Hence, although the letters are constructed and designed, there is still a difficult part for the copyist to perform, for in each combination of letters there are irregular shapes between letters, and one should endeavour to make these balanced spaces of white paper.

For beginners in lettering it is a good thing to have one factor which remains constant—that is, the letters. The children will still have to decide the size of letter for the space to be occupied, and then space the letters comfortably along the line. They will probably have two or three different-sized lines of letters, according to the importance of the wording, and this will be quite enough to occupy hand and eye.

There is no better practice than getting correct proportion in lettering, and no better test of firmness and steadiness of hand than in lettering drawn with pen or brush. While most people can see and realise obvious faults, it takes a keen and experienced eye to note the niceties of lettering and spacing. The children should begin on letters of a fair size, placing the letters between lines three or four inches apart, and working freehand with pencil and brush. Having first drawn these alphabets carefully once or twice they should memorise them and test their memory of the proportions in a free translation with the brush.

Here is something more free and amusing, an illustration of four ornamental capitals.



ORNAMENTAL CAPITALS

Things like this are good fun to draw but it is necessary to be able to draw the letters properly first. The A and the O at either end are rather ordinary, each being a plain letter in a square shape covered with an all-over line pattern. The two inner letters have received an essentially modern treatment. The letters themselves are more than plain, they are severe; one is in white and one in black. The background or setting is totally different in idea and technique from the first two. In those we have a white letter set against a pattern which makes a grey setting further relieved by dark lines of shadow. The two modern ones make use of gradations to give sharp contrasts here and there, while some outlines are softened by parallel lines. These sharp contrasts give vitality, while the gradations give subtlety. Although the two middle letters are smaller, it will be seen how much more alive they are, and how dull and antiquated the outside ones appear in comparison.

Next is a very amusing A and a highly decorative P. At one time there were



AN AMUSING "(A)" AND A DECORATIVE "(P)"



[Designed by Leslie Badham, R.I., R.B.A.]

PLATE XIV. B.—TYPE, PRINTING AND LETTERING—LOWER CASE
(Class Picture No. 108 in the Portfolio.)

alphabets like this A, and they never failed to interest and delight. It is not only great fun but very good practice to see how many letters one can construct on these lines, keeping the shape of the letter and fitting some figure or object into the shape.

So much pattern design consists in adapting and arranging things to fit into some given shape that an exercise of this kind is no waste of time but one that leads

in the right direction, for so many children say, "I can draw things I see, but I can't imagine things." A little encouragement usually shows them that they *can* imagine and in this way the imagination is stimulated. If they cannot at first imagine figures, they can make decorative capitals like the capital P, which becomes an exercise in black on white and white on black.

XV. CARPETS AND RUGS

Carpets can be roughly divided into three classes: (1) Old Oriental; (2) modern reproductions; (3) modern. The first are of course expensive. We should place a really fine example among the most beautiful things that have been made for man's use. An article which will last five or six hundred years, retain its beauty after having been in use possibly for a great part of that time, and still delight us with its pattern, colour and texture, is a great achievement.

Of course, there are not many carpets so ancient as that, and they are usually in museums. In any case we are hardly likely to be able to afford a real old Oriental carpet, but the Oriental carpets made to-day are not too expensive, and as these follow the traditional pattern and weave at the same time giving good wear, there is still a considerable demand for them. Many are not woven in the same way as the old ones. Factory conditions have prevailed, and time and cost have a different meaning from what they had in those old days. The colour of the modern carpets has suffered by the introduction of aniline dyes, but there are still beautiful things to be found at a reasonable cost. These belong to our second division—modern reproductions. In addition to those made in the East, there are British reproductions in which skill and craftsmanship have been combined with the modern power loom, to follow out every detail of design and colouring of the originals, in a manner which delights all who appreciate a good Oriental carpet.

On Plate XV, the top three are Ryijy rugs from Finland. The first with its trees and candles on a rich orange ground and its delightful picture panel is a very unusual design in a rug, and very lovely in colour. No. 2 has something of the look of a sampler—the same simple kind of pattern making. Notice how the stars or crosses on the outer border are used to soften the line in parts but not equally all round. It has all

sorts of artistic touches of that kind, a feeling for design that is very different from knowledge or skill, and that makes it precious. No. 3 has much the same quality, only in a more evenly distributed pattern. It, too, is a lovely colour.

We should particularly notice in these three examples the life, vitality and joyousness both in the pattern and in the colour. These are from 130 to 230 years old, and yet they retain their brilliance and harmonious colour.

Below these are three Oriental rugs, reproduced from genuine old rugs of considerable age, which have kept their life and sparkle and colour.

The following test might be used with the class. Take a sheet of paper and just cover the lower five examples on the Class Picture. Look at the upper part for a minute or two, endeavouring to keep the mind on the colour and general effect. When you have thoroughly absorbed the impression and can retain a mental picture on the retina of the eyes, quickly reverse the paper so that the lower part of the Class Picture is shown. Repeat this change-over three or four times, until you have two definite impressions to compare—two impressions of colour. We think that all the adjectives you would use to describe the upper part would be on the joyous side—bright, sparkling, warm, cheerful, clean, healthy, and so on, while for the lower part they would be just the reverse.

The pattern of the five lower examples is modern. Some are only parts of a carpet, but enough is illustrated to show pattern and colour. Most of this modern pattern is meaningless—it is without purpose, organisation or intention. It wanders about aimlessly in a distracted way. The parts are unrelated and the effect is worrying and fussy.

The purpose of the designer comes from the desire of the younger generation to brighten things up and make their surroundings more lively. Movement of some kind has to be introduced or suggested.

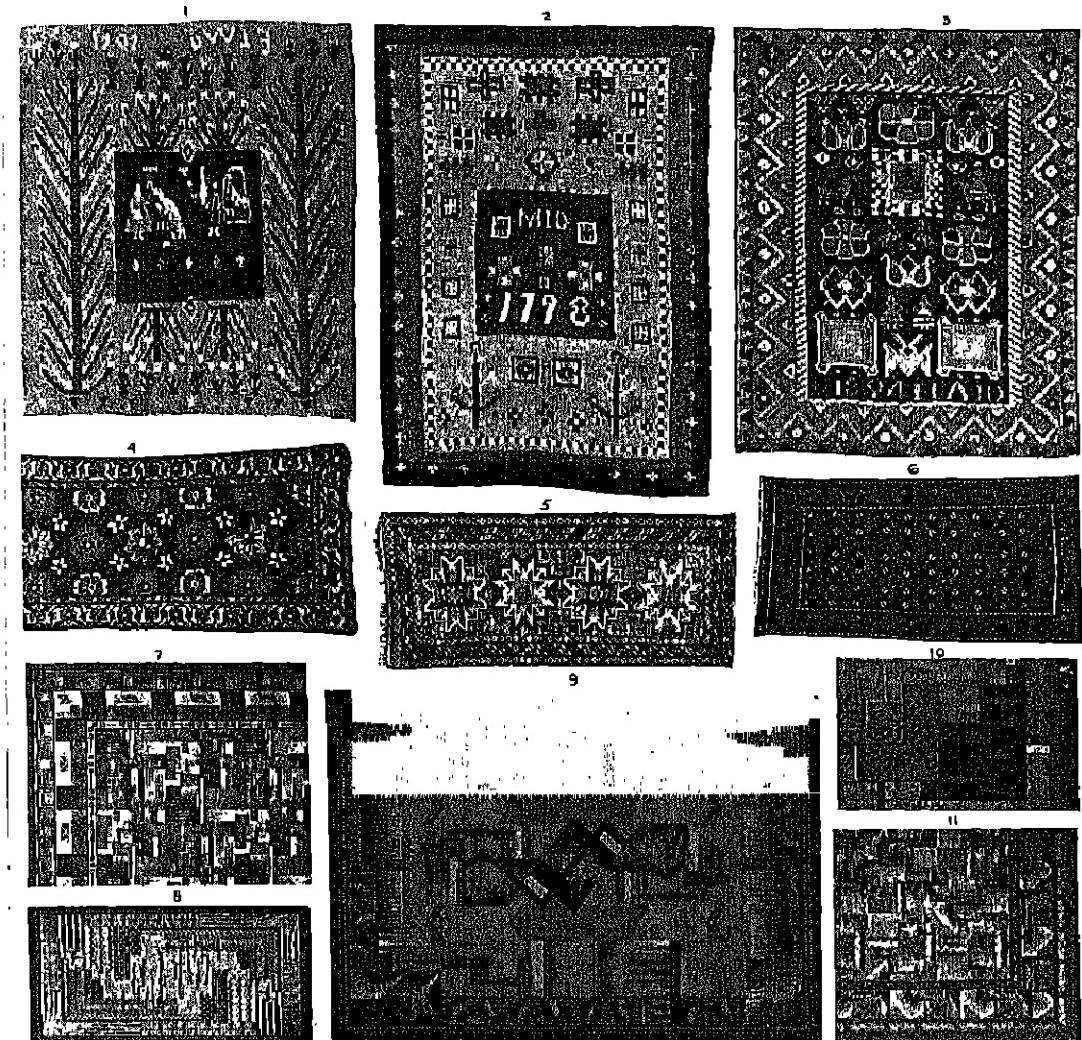


PLATE XV.—CARPETS AND RUGS
(Class Picture No. 109 in the Portfolio.)

Often an entirely inappropriate movement is suggested, or is introduced in a place where movement would be better avoided. In a floor covering, an essential feeling is one of stability and flatness. All patterns give movements of some kind, but there are some patterns that do not disturb the equilibrium or the level surface. For instance, the floor space can be broken with a line design, as with tiles, without any loss of stability.

Then there are patterns which, so to speak, revolve on their own axis—they occasion a slow movement of the eye all over a level surface. These are the two kinds of pattern which have been used by all nations and all ages. They are entirely appropriate for all kinds of floor coverings, not simply because we have got used to them, but because they are the logical and inevitable choice of a long line of craftsmen.

XVI. CURTAINS AND COVERS

When furnishing a house, a good deal of difficulty is always experienced in the selection of suitable curtains and covers. The kind of material must be decided by considering its wearing qualities, its thickness and texture, its surface and the way it drapes.

The colour must be in harmony or in contrast with other furnishing. It must give the right atmosphere to the room, and a further thought is—"Will it quickly fade?"

Pattern is difficult to decide. It will be useful to consider the pattern of the materials illustrated on Plate XVI. Taking the three pieces of material at the top, No. 1 is an all-over spot pattern; No. 2 is a soft fuzzy pattern; No. 3 is a bold vigorous one. These simple terms, spot pattern, soft pattern, and bold pattern, enable us to divide pattern into three groups, not that there are any hard and fast divisions between the three kinds, or that the shop people will understand this way of describing things. Some spot patterns are designed on a geometrically planned base; others have a linear pattern running through and holding them together. They may be dark spots on a light ground or light spots on a dark ground.

No. 2 is simply a soft wavy pattern. The essential character of this kind of material is that it is quiet and retiring, mysterious and elusive.

No. 3, a bold pattern, is geometrically planned. It has a horizontal, vertical and diagonal arrangement.

No. 8 is a modern design, original in many ways. It is entitled the "Pleiades" and includes sky and clouds, stars and planets, rainbows and huntress and unicorn. The colour can be seen on the Class Picture. It is well designed and drawn, unusual in colour, clean and fresh in appearance. It is printed on a smooth, fine white cotton, and is a chintz. This one is so well printed (the colour has gone so thoroughly through the cloth) that it is difficult to decide which is the right side, so it is reversible.

The name "chintz" is applied to-day to any glazed printed cotton. Before the days of machinery, the characteristic shiny surface was obtained by hand with polished flints; to-day the fast-revolving drums of the friction calendering machine obtain the same effect much quicker. Any unglazed printed cotton is called a "cretonne."

No. 9 is a pleasing and effective pattern, and shows just what is meant by *formalising* in treatment. All ordinary visual proportions are discarded; one or two big leaves suffice to suggest the tree. Even though we know nature is not like this, the mind accepts it as sufficient explanation in a scheme where so much is left to the imagination. The charming little groups of deer, herons and tall reeds and grasses, are all treated in the same simple decorative way and fill in and complete the pattern.

No. 7 is printed on linen in the natural shade of the flax. It is a most beautiful printed fabric. Designed expressly to go with Persian carpets, it has been very successful. The colour is a delight. Printed in nine or ten colours, a great deal of thought and ingenuity have been used to get variation and quality through every part, so that while it is essentially a *printed* material, it has a similar effect and appearance to a fine Persian carpet. Note in this one the diagonal planning which resolves the basic pattern into a series of diamond shapes.

No. 4 is printed on cloth, woven with a wave pattern and is screen printed, which is really a method of stencilling with a roller through a mesh. This is a delightful fabric in grey and blue on a warm creamy ground. The darker pattern is a lovely greenish blue and the lighter leaves warm grey. This pattern is called "Bamboo Grass" and is also printed as a chintz in green and fawn, blue and fawn, browns, etc., and it is printed also on linen. No. 5, called "Silhouette," is on satin and is also screen printed. The great feature of this fabric is its richness.

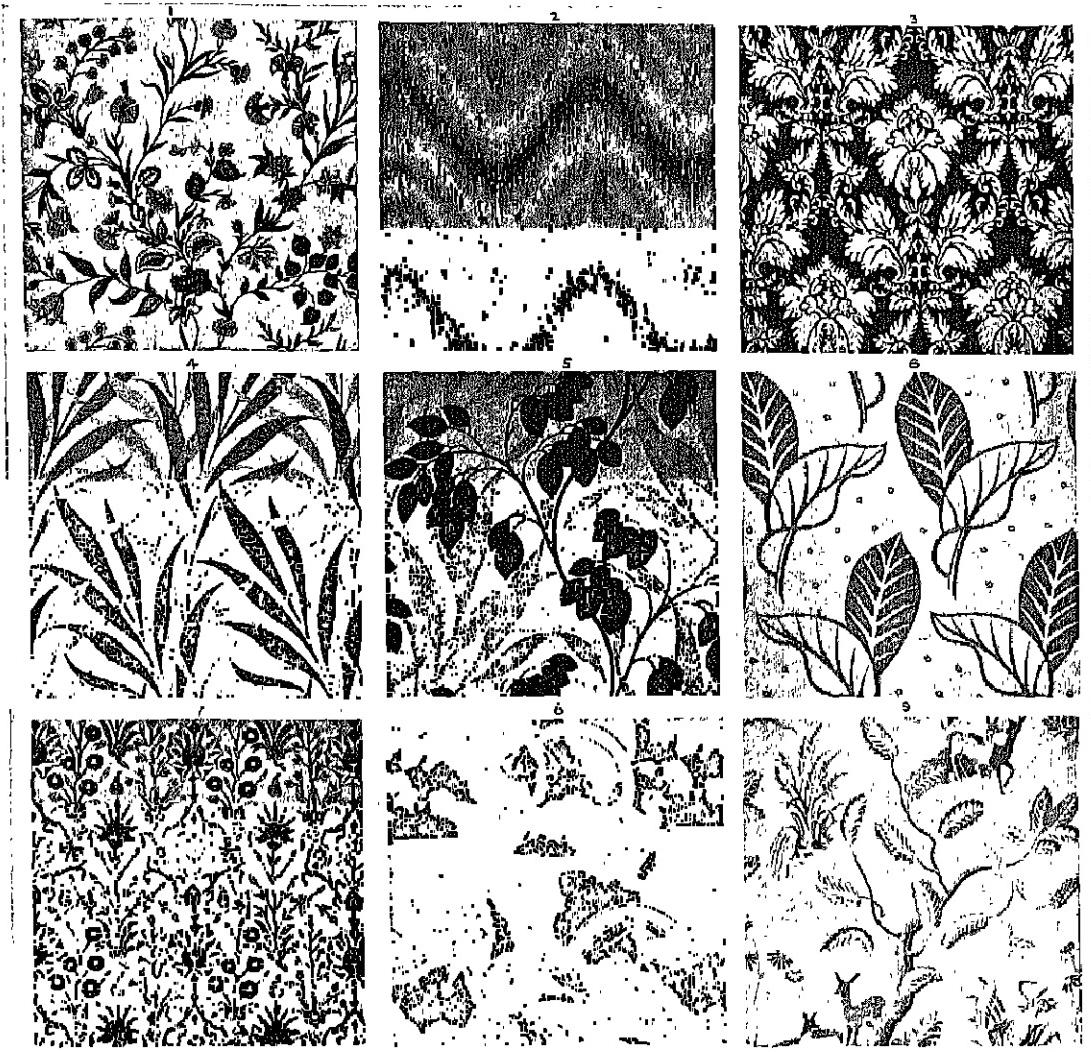


PLATE XVI.—CURTAINS AND COVERS
(Class Picture No. 110 in the Portfolio.)

No. 6 is a woven fabric with something of a silky sponge-cloth texture in cream and gold. It is reversible, so that one can have either the gold leaves on a cream ground or light leaves on a golden ground. The side shown is actually the wrong side of the weave, but there is no reason why one should not use either side of any fabric if its appearance is preferred. With some printed fabrics the effect is so much softer and

more melodious on the reverse side, that one should have no hesitation in making use of it.

It may seem a strange thing to say, but some fabrics are too conscientiously printed. In surface printing the texture of the material should not be obliterated by solid overprinting, but should be allowed to shimmer through the printing ink. Reds are frequently made hard and solid like lumps of sealing wax lying on the surface.

XVII. LIGHTING

We spend such a large part of our lives in artificial light that the consideration of the best means of lighting our homes is of first-rate importance.

In any discussion on the appearance of our homes we have to take into account the fact that we see all our furnishings in two different aspects—by day and by night. Where electricity or gas is available we can have light wherever we want it; we can concentrate it, diffuse or reflect it as we wish.

So far as general lighting is concerned, it is most important to avoid glare. Too much light may be as bad as too little. A glare is just as bad for the eyes as working or reading in a poor light. At the present time there is a tendency to illuminate each room with as much light as possible. Many small rooms are over lighted. There is all the difference between a good and sufficient lighting and a light that dazzles. If we want our homes and possessions to be seen properly, we must take care that the light itself does not take all the attention, but is arranged to illuminate all to advantage. In any case, the actual light should not be seen, it should be shaded or screened from the eyes.

Nos. 1 to 11 on Plate XVII show some early electric light fittings. From these it will be seen that they follow the style of their predecessors—the gas chandeliers, brackets, globes and shades. The gas chandeliers followed the former candle chandeliers and holders. This is the usual way with new inventions. Each fresh introduction at first assumes the style and character of the old, and it is only when the new becomes established that it is realised that it has individual needs and purposes to give it shape and character of its own.

In the early days of electric light there were few ceiling lights such as are made to-day. The old wall brackets were clumsy with unnecessary fancy-shaped blocks of wood to fasten them to the wall. The chan-

deliers were adjustable by means of a counterpoise weight and pulleys.

Whether in a suspended lamp or a table lamp, or elsewhere, it is advisable to avoid cupids and figures of every kind. The feeling one has about these things is, that if the figure is a good one it should be enjoyed for its own sake, and not put to utilitarian purposes. If it is not a good figure it has no place in the home.

Those old lanterns, whether old horn lanterns or suggestive of ships' galleys, are quite out of place for a modern illuminant. No. 11, intended to stand on the newel post at the foot of the stairs, would be a bad thing placed in the worst possible position. It would be bound to cast a checkered shadow round the floor and lower stairs, just where it is essential that one should be able to see clearly.

The standard lamp No. 9 is a fantastic shape in brass. It is far better to have a plain tubular upright, for it is simpler and more appropriate in every way.

Things should have architectural qualities rather than fancywork qualities, that is, things should look as though they were part of the place and permanent, rather than temporary or put there by accident. That remark applies also to fittings of all kinds, and if one remembers this, a great deal of fancywork will be avoided, especially in light fittings, brackets, table lamps, standard lamps, globes and shades, for all these things can have permanent rather than accidental character. On the right of the Plate central fittings for ceiling lights give a good idea of architectural design. No. 12 is what is called a "bulkhead" light; No. 13 is a modified light of the same sort; Nos. 14 and 15 show a range of shape, from the box shape to the more decorative shape. Nos. 16 and 20 have already been discussed. No. 17 is designed to project a little below the ceiling, to reflect light and yet be attached to the ceiling by a ring support. Nos. 18

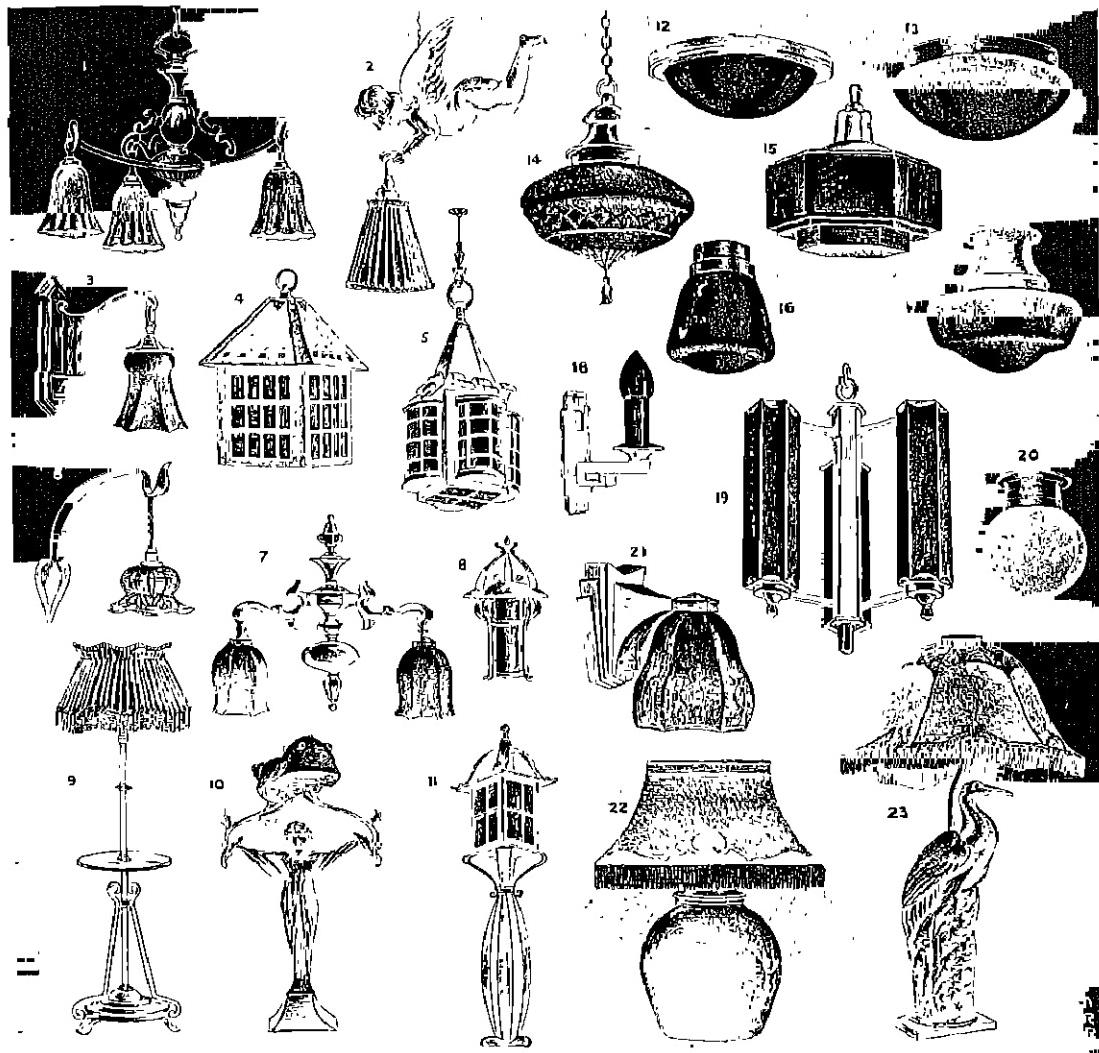


PLATE XVII.—LIGHTING
(Class Picture No. 111 in the Portfolio.)

and 21 are Bakelite brackets. No. 19 is the architectural style.

Of the two table lamps, No. 22 is included to show that large vases used as the base for a lamp generally cast a big shadow surrounded by a narrow circle of light, which clearly indicates that a narrower base tapering toward the light is better. With all lamps like No. 23 we would use the same argument as we did about

cupids and figures—they are wrongly used.

We can try an experiment with this Class Picture as we did with the two Class Pictures in colour. Cover half the sheet at a time and compare the left-hand side with the right. It will be seen that the simpler modern design has much more light and a brighter effect. Although there are twelve articles on this side and eleven on the left, there are an equal number of lights in each.

XVIII. THE CLOTHES YOU WEAR

The main object of this talk is to indicate how to make a right choice of material for clothes as a means of self-expression. Any selection that is made is in itself an expression of the wearer. Individual character is shown in every choice, provided that it is a definite personal selection.

Dress materials are usually finer in weave and smaller in pattern than furnishing fabrics, and whatever the climate or weather conditions, the nearer the material is worn to the skin the finer it is. Dress materials not only have a smaller and neater pattern than furnishing materials, but they have also more life and sparkle and are mostly lighter in effect and brighter in colour. Things that are actually in contact with life must contain some of that life and vitality.

With regard to the statement "brighter in colour," it should be remembered that the smaller the patches, the brighter the colour. In a paint box there are no colours bright enough for the very small spots. It would be a great mistake to wear a whole dress of a crude shade of electric blue, magenta, scarlet, or any other aggressive colour. Also, one should avoid violent oppositions of colour.

The ground shade of a material should be toned and quiet because it forms a large mass, against which the small pattern can shine with the utmost effect. But one should particularly avoid dull, lifeless materials and muddy or turbid colours. Even in winter materials, which are naturally quieter in every way, cloth has interesting texture and life in the colour employed.

Dress materials should have sparkle and vitality because they are always in movement, and movement in the patterning becomes a factor in the design. Just as movements are undulating and springy and not angular and jerky, so suggestions of movement in the pattern should agree.

The complexities of weaving have been overcome by machinery so thoroughly and

effectively that we have to-day fine cloths available for everybody at remarkably low cost—beautiful plain cloth of every thickness and texture, from fine lingerie materials to thick material for winter wear. It is not only to the power loom that this is due but also to the manufacture of artificial silk. Rayon and its allied products have brought into our homes rich brocades, velvets and tapestries, and to adorn the person it provides beautiful silks and satins and cloths similar to linen and cotton. The range of printed materials exceeds anything that one can imagine.

On Plate XVIII are shown a series of dress materials. In No. 1 the grey ground is printed on a white satin, leaving the white for part of the pattern, and outlining parts in a rather darker grey. The pattern is completed with gold which glimmers all through the design. White and grey and gold—a gorgeous material for evening dresses and gowns!

No. 10 is on a warm buff or biscuit-coloured material. The formalised flowers are printed in yellow and orange, with an occasional touch of green for a leaf—altogether a warm colour scheme and a pleasant type of material for everyday wear.

No. 2 is on a brownish linen, the groups of buttercup-yellow flowers and dark green leaves are spaced with smaller groups at intervals. No. 3 is a lingerie fabric with a soft, pale, grass-green ground, with white and pale orange flowers and blue-green leaves, all in a light scheme. Nos. 4 and 5 show the way in which patterns are often reversed. In No. 4 the pattern is printed in black, in No. 5 the background is in black.

The next two are such materials as children love to wear. No. 6 has white ducks on a blue ground; No. 7 is one of the fabrics specially designed by Mabel Lucy Attwell.

Nos. 8 and 9 have a novel feature—a gold printing which gives them an exceptionally rich appearance. No. 8 is a gold pattern on black, but in the reproduction

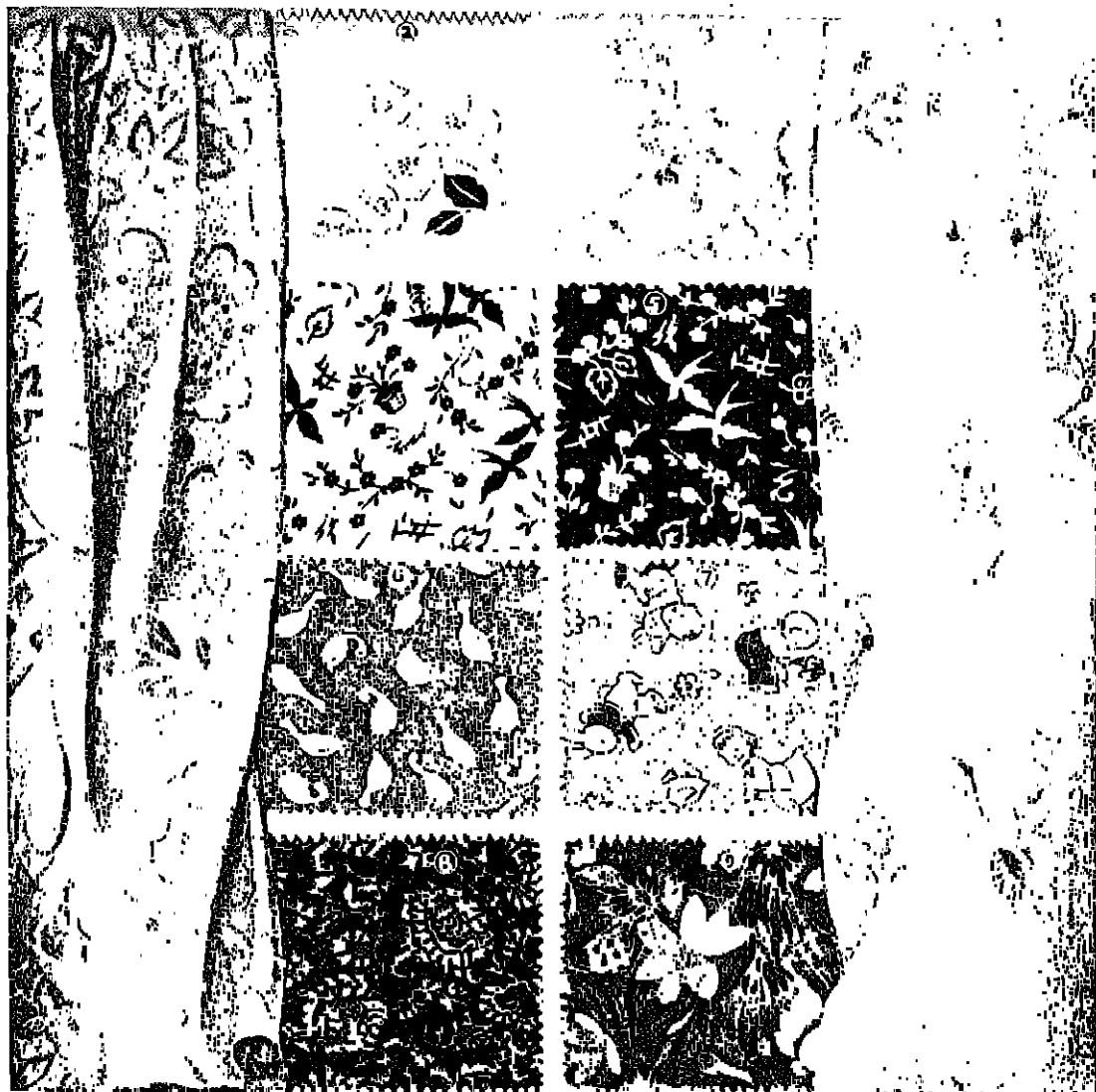


PLATE XVIII.—THE CLOTHES YOU WEAR
(Class Picture No. 112 in the Portfolio.)

one misses the essential glitter of the gold. No. 9 is a very beautiful dress material in soft bright colours, black and gold.

The purpose of this Class Picture is to give an impression of light dainty fabrics, with small sparkling patterns of rich and lustrous effects in light schemes, and brilliant and scintillating darker fabrics.

One should endeavour to assess and convey the "mood" of each example as well as discuss the pattern effect and the material, and as these are each printed in a variety of colour schemes, one should try to imagine which colour scheme would suit each mood and fit in most agreeably with the nature of the pattern.

XIX. ARRANGING YOUR ROOM

The Plate illustrates two styles of furniture and furnishing, both essentially modern in design.

The furniture in the top room is extremely simple but well proportioned. Here it will be seen that the wood of the wardrobe and chest is carefully selected and the outside edges kept lighter to emphasize proportions, while the pattern of the wood is subtle and never obviously marked. It is easy to see from this Plate that in a room this plainly severe furniture is balanced by informality in the fabrics, curtains, bedspread and rugs. A few darks are necessary in such a light scheme. Notice that even the spots of the drawer knobs are welcome small patterns. The picture and mirror complete the scheme and give balance. All the pieces are made about the same depth from back to front, so that if they are against a wall, the fronts come flush. This enables one to put any articles side by side and avoid irregular frontages. The dressing table group is compact with everything convenient. The circular mirror gives variety in shape and is repeated in the bedside lamp (for that is the purpose of the round, capped globe on the right, which looks like an alarm clock).

We will now look at the other end of the room, the living and working end, illustrated on the lower half of the Plate. In daylight the writing table would be an awkward corner at which to write, but the general effect is very pleasing.

Many people would object to placing a vase of flowers on a radio receiver, but perhaps that is personal prejudice. The picture, books and accessories make this setting look very homely and comfortable.

The units fit in well together and give a sense of continuity, where separate pieces of furniture often look isolated and detached; the units, too, generally occupy less floor space.

It is always advisable to create a balance between somewhat conflicting desires. Furni-

ture and fabrics must have some measure of agreement. In all Plates in this talk, practically all the curtains and covers are vertical and horizontal in design. Vertical and horizontal lines suggest peaceful and restful feelings—those qualities that most people wish their homes to possess. To further such a scheme there is plain square furniture—cabinets, bookshelves, tables, all of the same height in horizontal lines resting on rectangular patterned carpets and rugs. Only the larger articles of furniture break the lines and they still continue the plain square shapes.

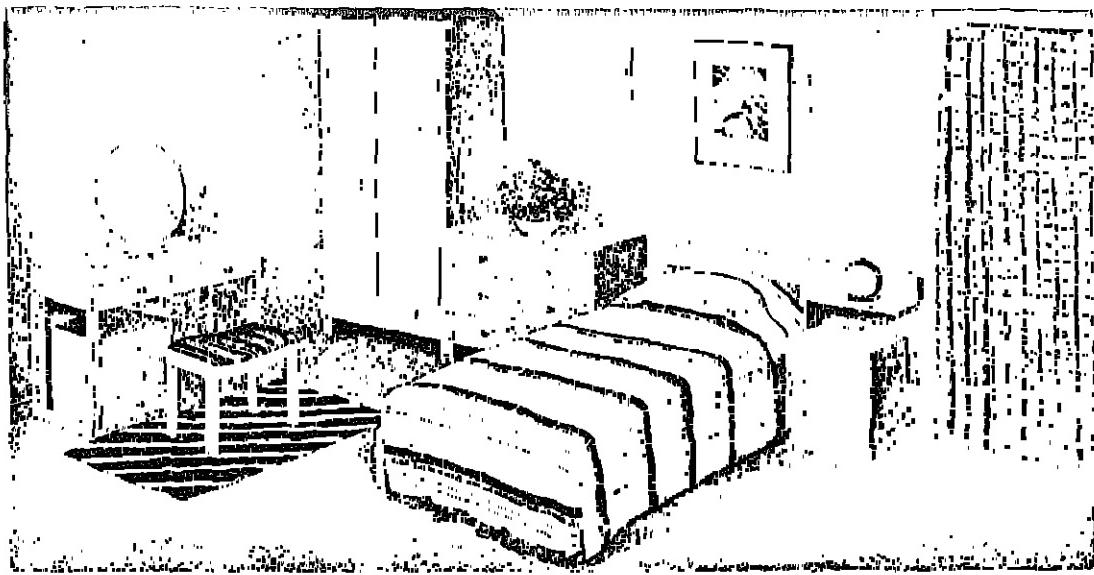
It soon becomes obvious that such an arrangement continued too far will produce monotony, so shapes must be included to counteract—a circular mirror to the dressing table, a round-backed arm chair to the writing desk. Note in the Plate how grateful the eye is for this relief. Then the bookshelves can be adjusted to form steps to build up and consolidate a corner, or to make gentle slopes and vary the horizontal lines.

In the fabrics there is generally some relief from the horizontal, for the natural folds of the curtains give them vertical stability.

It is this kind of balance that one has to try to attain. If the lines are peaceful, the other qualities must agree. The proportions must be graded and not too sudden. There must not be too violent opposition of light and dark, and the colour should be quiet and soft.

What about pictures and ornaments? Let us say at once, that we do not agree with any bare wall theories. A room without pictures has no outlet for the imagination.

We are living through a period which is hard, stern and materialistic. An elementary desire, behind most of our home building is to form a retreat into which we can escape from this outside world. If our retreat consists of four bare walls and a few pieces



[Reproduced by courtesy of Gordon Russell Ltd.]



[Reproduced by courtesy of Bowman Bros., Ltd.]

PLATE XIX.—ARRANGING YOUR ROOM
(Class Picture No. 113 in the Portfolio.)

of box furniture, it becomes mentally a *cul de sac* and a trap. We need comfort and humanising influences, and above all imagination. It is largely because we have stultified imagination that we have need of a retreat.

The right kind of pictures do undoubtedly

stir the imagination. Pictures, music and poetry enable one to live for a time on a higher plane, and if their duration is short their influence is a lasting one. These are the real influences that give joy and colour to our lives.

XXI. PATTERN

Let us imagine a plain smooth wall. Being quite plain and smooth, it has no particular interest, it is merely a wall. We can give this an interest by adding colour; or we can give it interest by breaking up that smoothness with patterns of every kind. Suppose we lay out our first patterns geometrically, and square up our paper with diagonal lines, as in Nos. 1 and 2 on the Plate.

If we put a spot on each place where the lines cross we shall have an evenly spotted pattern which has vertical and horizontal direction, and also sloping direction to right and left. We can alter or add to this in several ways. We can put a small flower shape in place of the spot, as in No. 2, or make a larger group on every alternate centre, as in No. 1. The groups, too, might contain different shapes, while if one felt that the whole scheme was too regular and symmetrical, it would be easy to upset this precision by placing a spot or two irregularly within each square.

These patterns on the wall have no movement in themselves, but they create a movement in the eye of the beholder. If they are simple and obvious patterns, we may see them without taking notice of them. There must be something of intrigue and interest by suggestion. The spots themselves produce a vibration rather than a movement, while lines tend to give directional movement, for the eye follows them along.

The next two patterns, Nos. 3 and 4, are from book jackets—things to be held in the hand and viewed at closer range. No. 3 is entirely formal and conventional and is obviously designed to convey that impression. We should certainly not expect a book with a cover of this kind to be full of action and drama or exciting adventure. Rather we anticipate a book of verse or essays. No. 4 makes a skilful use of the plain diamond latticing to give a different picture in each space and to introduce points of special interest in the faces which occur at intervals. Some of these are obvious and others mysterious.

Human interests are so much more powerful than aesthetic interests, that they can overbalance the design, so although it is quite legitimate to introduce portraits and characters into any scheme, they are usually more successful if they are kept subordinate to the design.

The figures No. 5 and No. 7 are very unobtrusive. In No. 5 one first looks at the design as a whole. Note its extreme simplicity and vigour. Then the eye lights on the face in the top border, follows the border along and finds a man's head below balancing the girl's head, and finally finds the reclining figure in the centre. This is probably a jacket cover for a romance. No. 7 is even more vigorous and expressive than No. 5. The little cupid with rounded cheeks blows and stirs the grasses with the wind and sets everything in motion. The shape of the design itself pointedly directs attention to the corners, and so suggests the winds from the four points of the compass; winds which blow across great expanses and set up eddies on their way.

No. 6 is intended to convey the recording of mystical events and dramatic happenings. In the top oval comes the figure of the scribe, events and drama are shown in the larger oval, while signs and portents are depicted in the surroundings. This is a very imaginative, well-designed idea. It is an excellent example of a symmetrical arrangement turned into a balanced design by the star with its comet tail, which adds much to the force, vigour and movement. It is big, bold pattern on the main circular shapes; smaller in the signs within the circles; smaller still in the curved and wriggly lines and stars of the lower sides, and still finer in the two oval pictures. This relieves the design from the bare black and white and gives it a tone quality. It is as carefully adjusted in tone as it is in pattern.

No. 8 is an example of radiation. Note how the straight base and sides of the outline shape are a relief which emphasises the curves within, while the variety in line and texture

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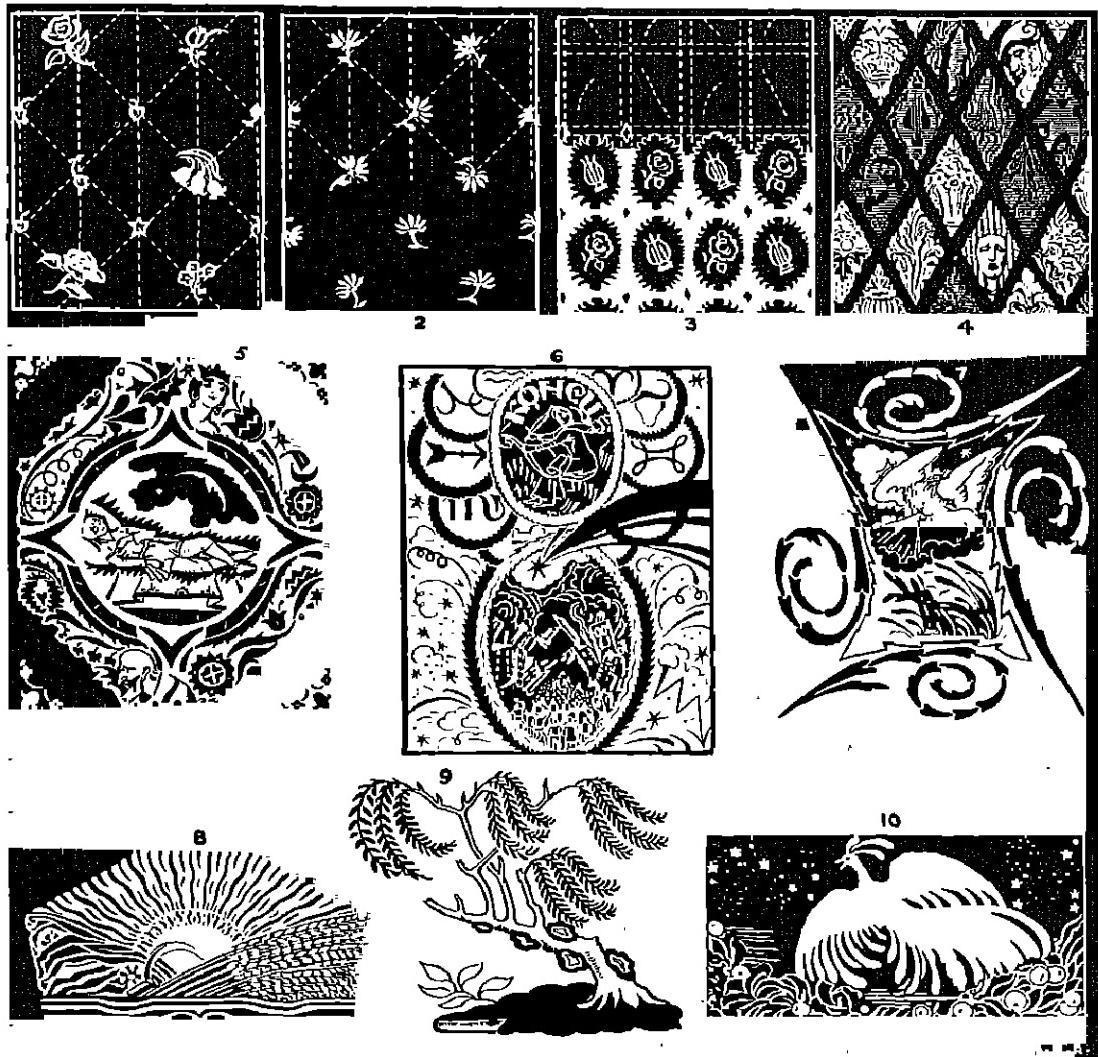


PLATE XXI. PATTERN
(Class Picture No. 115 in the Portfolio.)

give it gradation and sparkle. The ears of corn go one way and the stalks and weeds and tares another. There is no outline to the sun, but a series of surrounding circles suggested in the pattern give the effect of a glow of light. The actual centre of radiation is displaced by the curved lines on the left, and the sickle or reaping hook.

No. 10 is such a simple piece of decoration and such a very lovely bird that it tells its own story. It is so purely imaginative a

creation, and rears so majestically against a star-lit sky, that our minds are immediately carried away to a world of fantasy and romance.

No. 9, from the Chinese willow pattern, is the best example of what we have called "formalisation." One could not mistake the tree for anything but a willow, although one may never have seen a willow like it. It has all the essential character of the willow expressed simply and decoratively.

XXII. RHYTHM

The passive rhythm—a magnificent piece of decoration—is on a screen of about the average height and in six folds. The scheme is in black and white and gold. All the round-edged cloud in the upper part is gold, against which the white birds, the snow and the opposing darks, tell out with a splendour that must be seen, for it is too wonderful to imagine. (The vertical lines across the picture are the folds of the screen.)

There is no difficulty in accepting the two drawings as *passive* and *active* respectively. One is opposite and complementary to the other, and the two are examples of extremes of rhythm. The one is as near to absolute placidity as possible, and the other shows action throughout. But the passive is without sentimentality or lack of vigour; and there is fierceness and violent movement in the active without becoming too dramatic or theatrical.

The title of Shiko's work is a poetic conception, but it tells exactly what the painter sets out to convey—*Winter Melting into Spring*; not "turning" or "passing," but "melting." That implies a late fall of snow; when this melts, the earth will once more come to life and repeat the wonders of spring.

But first *winter*—that is the essential subject—snow, heavy weather, an old tree and three or four white herons. The tree selected is a willow, on account of its twisted and gnarled trunk and the suggestion of sadness in its drooping branches. This is set against a huge golden cloud. Why not? We often speak of golden cloud, why shouldn't the artist paint one? This is another poetic conception in keeping with the central idea.

As regards the planning, the whole of the pattern comes within a triangle with a long base slightly exceeding the length of the picture and thus suggesting the utmost stability and permanence. Being in six parts, the picture has a definite middle line so that the triangle is not symmetrical.

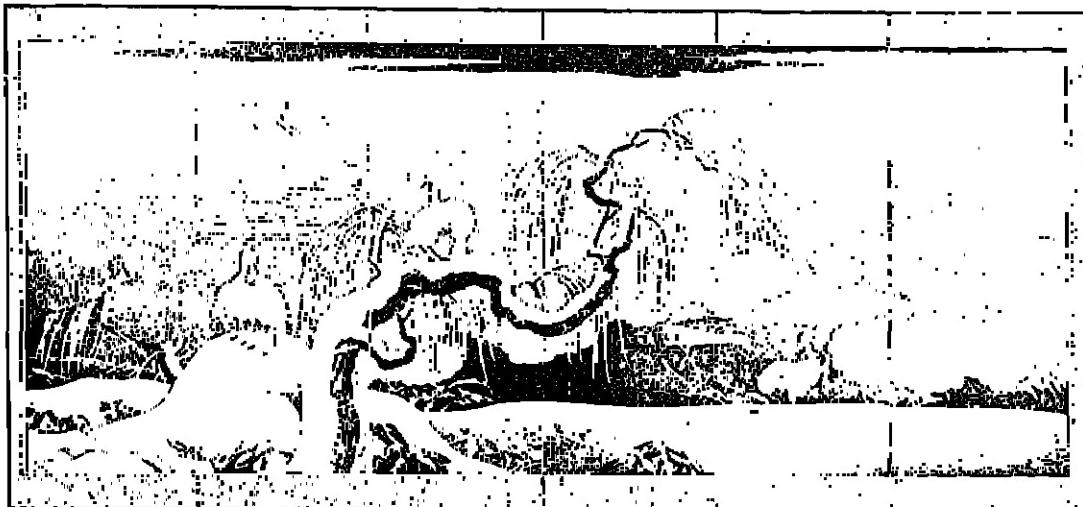
Notice how it has been balanced by a smaller triangle made by the groups of herons, and how there are other triangles all through the design. With these are contrasted the curves of the tree and the outlines of the cloud. The long line of the snow acts as a suggestion of horizon, beyond which we get glimpses of dark cloud. In the foreground one or two early blossoms give a hint of the coming of spring.

The idea, the choice of material, its placing, proportions and distribution, are all so related and so work together to one end, that the picture has a unity and completeness.

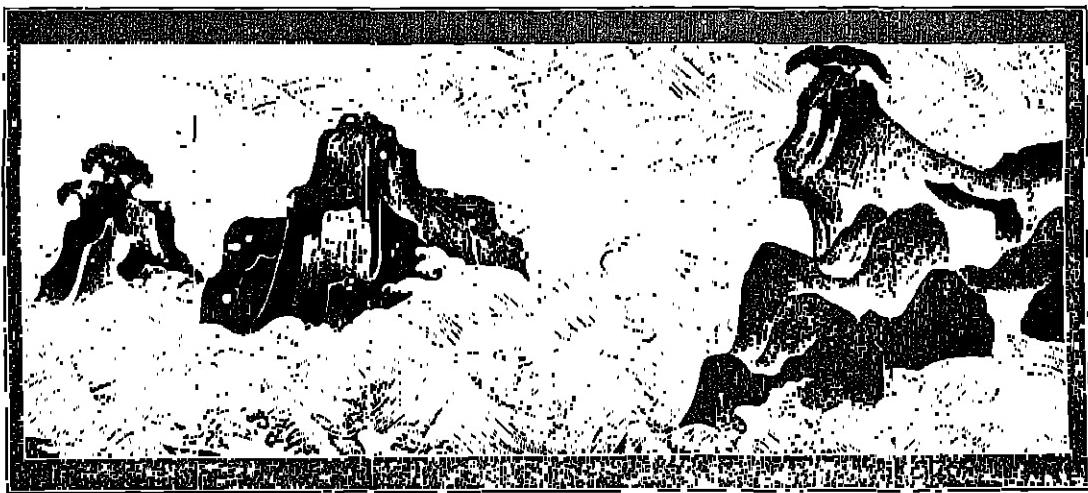
There is nothing so satisfying as a complete work of art.

The other picture is simple enough in its elements—three peaks of rock and tumultuous seas. But how magnificently this has been marshalled and presented. There is an unusual feature. It looks as though the picture has an horizon, and yet instead of clouds above, the waves seem to continue. They do continue. That long white horizontal band which fades away at the top corner is a convention for mist or cloud. Chinese and Japanese artists used it for centuries. Its real purpose was to introduce a difference of texture in the design and a difference of feeling to the mood of the picture. In this case its use is admirably justified, for it suggests an horizon, and intrigues and interests us in a part where the wave repetition might have become monotonous. It also makes a splendid foil to the whirl and fury of mighty forces and carries the mind on to the calm that comes after.

Now let us look at the construction of this wonderful wave pattern. The waves are not easy flowing, but a rapid up-fling, a sharp curve, and a sudden descent. This line achieves the greatest possible energy and force and is constantly repeated in each wave to give each surface added power and movement. The lines of waves follow each other in irregular formation and are broken



A PASSIVE RHYTHM, WINTER MELTING INTO SPRING, BY SHIKO

PLATE XXII. AN ACTIVE RHYTHM—WAVE SCREEN, BY KORIN
(Class Picture No. 116 in the Portfolio.)

all over by the white caps of foam. These rear and move in all directions and add conflict to force and movement. The rocky peaks give stability and their broken and jagged outlines show signs of the power and continuity of the elements which they oppose.

The little trees on top of the near rock remind one of an eagle with outstretched wings poised for flight. It is an appropriate suggestion. No doubt the artist foresaw

that and hoped that it might occur to the beholder, for it is perfectly in keeping with an imaginative creation.

The picture is consistent in every way and all through it is drawn with a severity that equals the subject matter. It achieves consistency of pattern from corner to corner, and the rhythmic flow infuses the whole design. It is imaginative in conception and in technique.

XXIII. PICTORIAL DESIGN

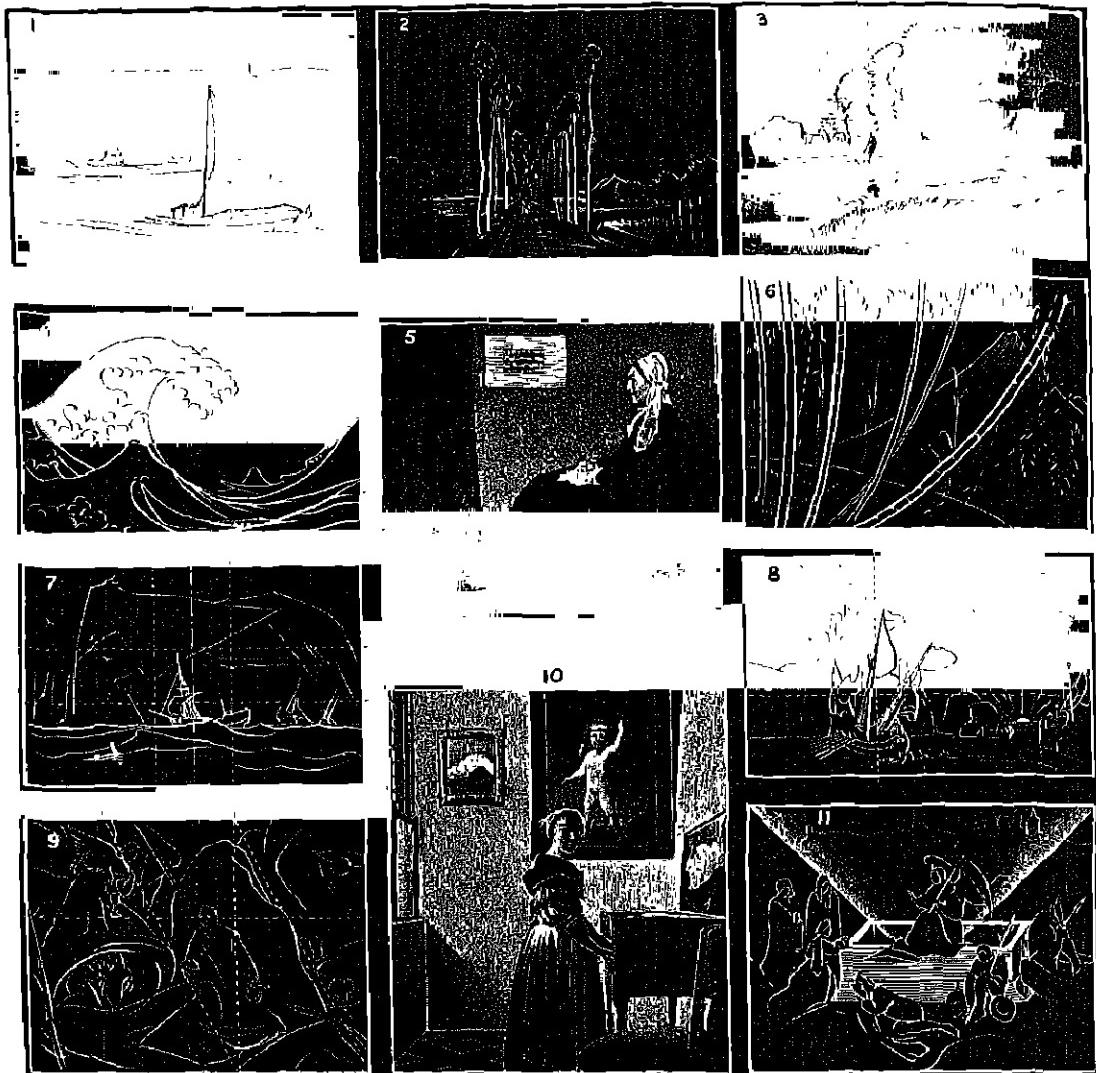


PLATE XXIII. PICTORIAL DESIGN
(Class Picture No. 117 in the Portfolio.)

By design we mean the right selection and use of lines, proportions and colours in an order best fitted to convey what we feel or wish to say in our pictures. For our studies we have outlines of several well-known pictures.

No. 1 is a Japanese woodcut as slight and simple as an Indian ink drawing. Its lines are so few, yet so carefully placed—principally horizontal, offset by the mast, which is just off the centre. This triangle of mast and line to the stern give great stability to the



After the painting by Hobbema in the National Gallery

[Photo: W. F. Mansell]

PLATE XXIV. THE AVENUE, BY HOBBEMA

design. Most of the lines are slightly curved, thus giving the gentle motion which makes this picture so soothing and restful.

No. 2 is *The Avenue* by Hobbema, 1638-1709 (Plate XXIV). The main scheme of this picture is the uprights of the trees. (In No. 1 it was the horizontals.) Note how ascending verticals suggest affinity with all up-springing and upward-tending qualities, and are consequently joyous and pleasing. You can just see on the Class Picture an indication of where the lower golden rod proportion would come, and will notice that the horizon is set well below this. Where an artist wishes to suggest air and light and space, he generally reduces the landscape and adds to the sky, so the horizon comes low in the picture. There are examples of this in two other paintings, Nos. 7 and 8.

To return to our Hobbema. The centre at the end of the avenue is admirably placed. If you were asked to place a tall thin letter M (for that is the shape of the group of trees) on the picture space it could not be better placed than it is. From there we can follow the lines of the poplars upward to that serene silvery sky.

No. 3 is the outline of a drawing by John Sell Cotman. It is included for its square character. Trees, massive and square, set one behind the other, give a feeling of architectural stability and permanence that make this a characteristic English landscape. As it is a monochrome drawing without colour, we may well imagine that Cotman felt its proportions were sufficient in themselves and needed no addition.

No. 4 is a diagram of Plate XXV—

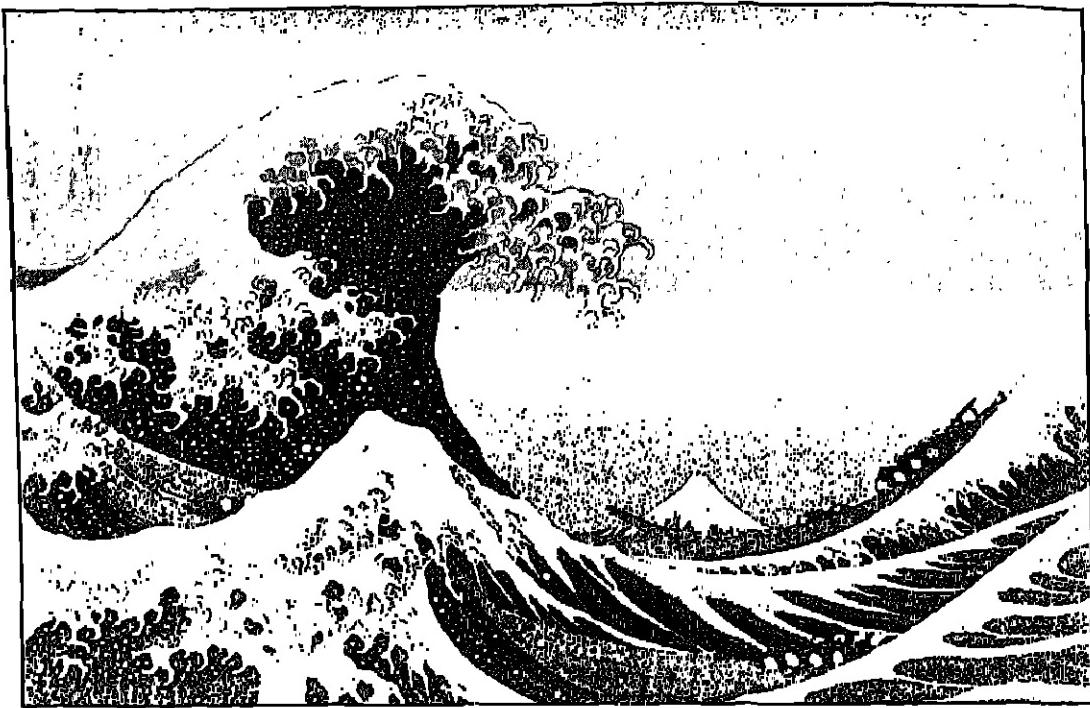


PLATE XXV. FUJI SEEN IN THE TROUGH OF A WAVE, BY HOKUSAI
A colour woodcut print from the *Thirty-six Views of Fuji*.

Fuji Seen in the Trough of a Wave, by Hokusai. It is usually known as *The Great Wave* and is considered by some to be his

masterpiece. Every line is expressive of power and grandeur. Its mighty sweep overshadows all the sea pictures we know. This is the sea in stern and relentless mood; the foam breaks into tentacles that reach out in all directions, and the boats with their oarsmen are only just seen, as they appear to become part of the rush of waters. Notice that the main curves attain the utmost dynamic force and weight, and that their upward fling is artfully increased by the repeating curve along the bottom edge, while the nearer, lower crest serves to buttress and support the main body. Even the troughs have their main lines laced and strengthened by converging curves of force and direction. The edges of



PLATE XXVI. A WOODCUT PRINT FROM THE ONE HUNDRED VIEWS OF FUJI, BY HOKUSAI

foam become broken and claw-like and sling out a starry glitter of spray that adds vitality. The whole of this is set against the rosy glow of a sunset sky.

We see in this how an imaginative conception far outweighs any naturalistic vision; how the *line* makes it dynamic, and the *proportions* give it power and dignity.

No. 6 (Plate XXVI) is also by Hokusai, but it is in lyrical mood. This is from the wood-cut print series *One Hundred Views of Fuji*, issued in book form in 1834-35. In this series Hokusai drew one hundred views, each having the triangular shape of the mountain Fuji as a *motif*. He used every possible device and method of design, and it is from this point of view that they are of extreme interest to students, though they are of such beauty that they appeal to all.

The design is a form of radiation. On the Class Picture are shown only the main lines. All the chief curves of the bamboo stems radiate from a common centre somewhat

below the left-hand side of the picture; the rest were put in so that the method should not be conspicuous. Behind these is seen the mountain. The top and right-hand sides are enclosed with the long spiky bamboo leaves, and the lower left-hand is contained by the bank on which the bamboos grow. These long radiating curves give the effect of a slow movement, a gentle swaying rhythm, that contrasts effectively with the austere dignity of Fuji. We have said that the mood is *lyrical*; by that we mean that its sensations are warm, soothing and agreeable.



[Reproduced by courtesy of the Trustees of the British Museum.]

PLATE XXVII. THE DISMASTED BRIG, BY J. S. COTMAN

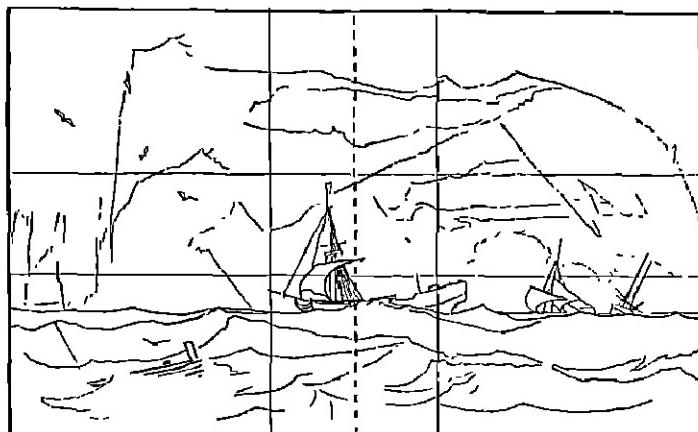


DIAGRAM OF THE DISMASTED BRIG

No. 5 is a diagram of the well-known picture of Whistler's portrait of his mother. It would be useless to apply golden rod or any ordinary tests to such a work as this, for Whistler had evidently determined to produce a portrait as far removed as possible from the conventional formula.

One great difficulty in portrait painting is that the arrangement so regularly falls into the ordinary pyramidal composition formed by the head and shoulders, particularly where the head has to come somewhere near the middle line of the picture.



[Reproduced by courtesy of the Trustees of the National Gallery.]

PLATE XXVIII. ULYSSES DERIDING POLYPHEMUS, BY J. W. M. TURNER

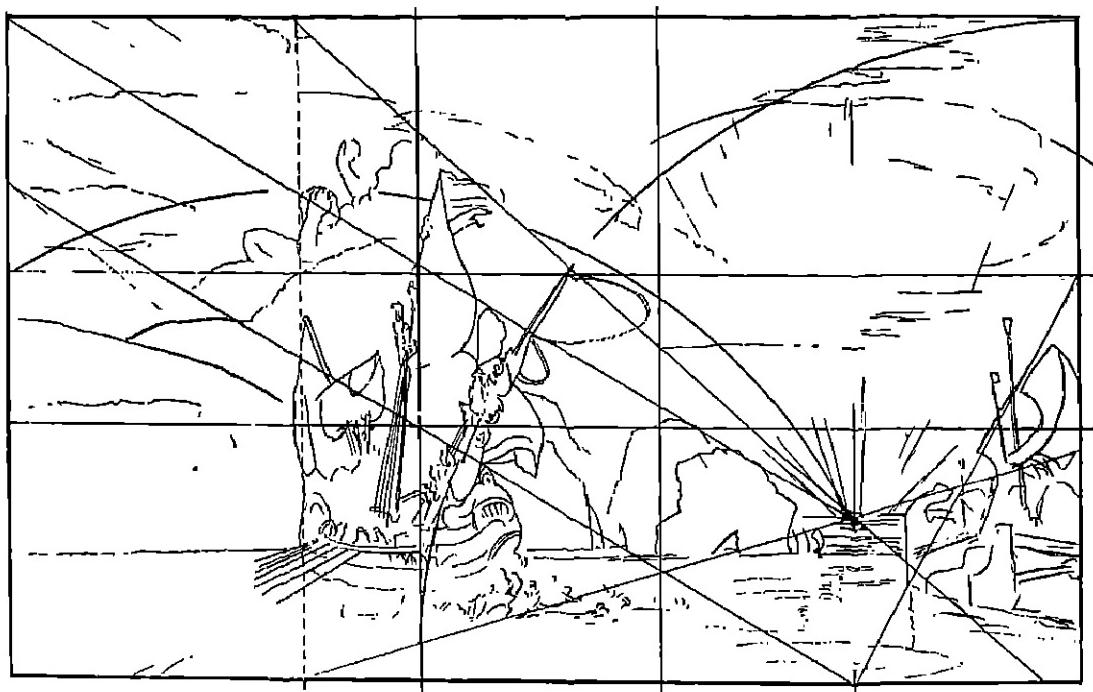


DIAGRAM OF ULYSSES DERIDING POLYPHEMUS

There is no doubt that the artist had been greatly influenced by the Japanese prints which had only recently been introduced into Europe. Their decorative qualities, linear design, proportion and balance gave a new impetus and outlook to the period, and Whistler was quick to absorb and fashion them to his manner of painting. This portrait is clearly a design of balance and proportion.

On looking at the *Portrait of the Artist's Mother* one might possibly be tempted to think that the curtain part could be dispensed with, but by masking it off one is quickly satisfied that the curtain forms a splendid and logical balance to the black dress. Balance is the essential feature of this design. It was Rodin who said: "Balance is the pivot of art."

No. 7 is a diagram of *The Dismasted Brig* (Plate XXVII) by J. S. Cotman. It is a very beautiful water colour, free and spontaneous in handling, with all Cotman's facility in laying clean washes of colour and leaving them untouched; fresh and breezy in feeling and colour and very soundly designed. It is an interesting design which introduces a form of construction that we have not met until now.

The mast still standing makes the disability of the brig more evident, and this remaining mast becomes the central incident. It forms a triangular shape just off the centre.

By its pictorial importance that triangle becomes the *key pattern* of the design, which is consistently triangular all through in larger and larger shapes. So this form of design is sometimes called "the enlargement of the key pattern." The mast with its billowing sail stands boldly silhouetted against a triangular patch of light sky; adjoining that is a rather darker similar shape; these in turn are broken into and suggest smaller patterns of like nature. This pattern is repeated throughout the sea and in the distant vessels.

If we take a pyramid, which is a symbol of permanence and stability, and show it in

poise or movement, we get by sheer contrast the maximum effect of balance. A particular instance of this occurs in the pyramidal shape of the ballet dancer's skirt.

Nos. 5 and 10 on the Class Picture are splendid examples of *static* (or still) balance. This Cotman drawing is an equally fine example of *active* balance. We shall find in No. 9, *The Greco*, the same principle used to express a mental stress and anguish. The original of this Cotman drawing with its atmospheric qualities of light and colour, is absolutely convincing and natural. In the small reproduction it appears rather more dramatic, but has the advantage of showing its organisation. Sufficient contrast to the angularity is obtained by a curve here and there. These are logically occasioned by the sail in the key pattern.

No. 8 is a diagram of *Ulysses Deriding Polyphemus* (Plate XXVIII) by J. W. M. Turner.

We have put these two sea pictures next to each other as in many ways they are exact opposites. The Cotman is light, fresh, clear and breezy; the Turner, rich, glowing and mysterious.

That is the essential quality of this picture —its soft, melting tones, glowing lights and shimmering darks, and over all its atmosphere of strange beauty and *mystery*. And in spite of all this envelopment, it has a sound basis of design.

It was pointed out earlier that the horizon has been set low in the picture to give air and light and space; and Turner goes lower than Hobbema or Cotman, as he wants to add dignity.

In this picture Turner has succeeded in reconciling two powerful pictorial interests—a sunrise and a beautiful ship. Inevitably one of these must predominate, so light and colour naturally have first place; but he puts the ship nearer the centre and the sun well out to the right. The ship is a ship of dreams, a fairy galleon, but the painter's extensive knowledge of ships enables him to give it these qualities without losing sense of reality, as in the same way his experience



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PLATE XXIX. THE AGONY IN THE GARDEN, BY GRECO

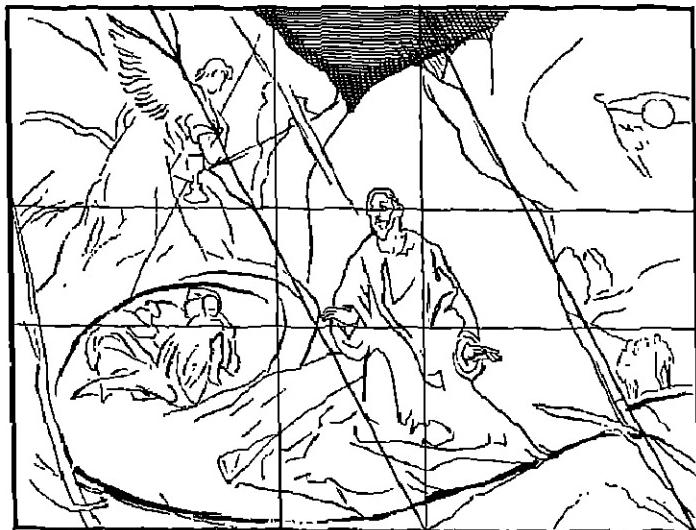


DIAGRAM OF THE AGONY IN THE GARDEN

allows him to make this sunrise the embodiment and summing up of *all* the strange beauties of sunrise.

In a picture where outlines are lost and everything softly suggested one may find difficulty in following the linear sketch. The ship is set against a pyramid of dark, while the uprising of the sun is accented by the dark rocks on one side and the ships of Ulysses' fleet on the other, so that we get a pyramid of dark, and an inverted pyramid of light. If you were to trace the one, and

reverse the tracing over the other, you would see that they practically coincide, so that the two halves of the picture (the top and bottom which fit into each other) are almost exactly equal in area. The golden rod proportions show something of the extraordinary precision with which things are placed by the artist's hand and eye.

No. 9 is a diagram of *The Agony in the Garden* (Plate XXIX) by Greco, 1525-1614.

The design belongs to the last period of his life. Greco made some half-dozen paintings of this subject, this being the final version. In it he made some daring innovations. His sole consideration was to attain a perfect unity between his subject, his design and his colour. His previous efforts had convinced him that in order to express what he wanted, the picture must have a *supernatural atmosphere*. That meant discarding all naturalistic treatment and concentrating on design and colour alone. So in place of all ordinary visual proportions, *relative* proportions have been used. A figure or an event is made of a size that its importance in the scheme warrants, and that scheme is to convey Christ's agony in the Garden of Gethsemane. An agony would seem an impossible thing to paint, but Greco succeeds and does so by his design, every part of which is expressive. The small line drawing gives some idea of this. An agony implies a sense of instability—everything in a whirl and a state of flux. Now look at the line analysis: right across the foreground we have a breaking wave form and similar curves of vapour or cloud swirl through the design. The golden rod proportion marked on this drawing shows that a line from the bottom corner to the top at this proportion, and a parallel line from the bottom of this perpendicular, give the main lines of displacement. Christ's head comes on the golden rod proportion, and His body fills the lower corner of this rectangular space tipped up on its diagonal. The disciples are shown asleep in the whirl of the wave form; on the circular sweep the

angel advances. To the right, across an expanse of dark sky, we have a second series of swirling cloud masses with the half-veiled moon in the hollow beneath.

Note also the number of triangular shapes and see how several are dark and heavy, particularly the one between the angel and Christ, and the one, ominous and portentous, that hangs poised above His head.

Sir Charles Holmes wrote of this picture:—“We see the supreme importance of rhythmic congruity in the logic of pure design. Now Greco in this respect is unique among European artists. Whatever our attitude towards his painting, we must admit its complete aesthetic consistency. His symbols maintain a perfect harmony with each other and with the general design. They are also uncommonly vivid and alive. The very high place accorded to Greco by modern criticism is thus aesthetically justified.”

With No. 10 we return once more to normal vision and homely setting. Our picture is by Vermeer of Delft, 1632-1675. It is called *The Lady Standing at the Virginals* Plate XXX. On the Class Picture, this and the one above it are shown in mass, while the rest are in line, as this *mass proportion* is their essential feature.

It is the exquisite balance of masses, proportions and colour which make this picture one of our most prized national possessions. Its pattern can be compared only with the finest of the Japanese prints. Its colour is infused with the warm diffused glow of sunlight, brought to a climax in the reddish gold picture frame on the left, and dominated by a most lovely blue, which is a perfect contrast. To this is added a three-dimensional effect which is so consistent and convincing that it has become the marvel and despair of all later artists. Every part is so exactly right in value of tone, colour and atmosphere. The girl's head comes some six or eight feet in front of the black frame and this without any blurring or softening of edges, such as lesser artists are compelled to use. So that when we spoke of a return to normal vision, we



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PLATE XXX. THE LADY STANDING AT THE VIRGINALS, BY VERMEER

were not referring to this artist's vision, where everything is exactly related and hand and eye perfectly attuned.

Here the ideal of the small picture

(intended to be viewed at close range) is attained. It reaches the highest peak of the endeavour to create a picture which is like an open window, or has all the semblance

of reality, but a reality ordered and conditioned by a master hand and an exquisite sense of values and balance.

No. 11 is one of the very first oil paintings ever produced. It was painted by Hubert van Eyck, 1366-1426. It is called *The Three Maries at the Sepulchre*, and is in the Cook collection at Richmond. Unfortunately we were unable to obtain a reproduction, but it will be sufficient for our purpose to tell you about its design.

In this instance there is some difficulty in separating the basic design from all the carefully painted incidents and details. Quite often the structural foundations get overlaid with the accessories, but though we may be unaware of this groundwork, its influence is felt. The picture shows the open grave with an angel seated upon it. At one end the three Maries are grouped, and around are the sleeping forms of the watchers. The background is formed by rocks on either side and a distant view of the town. On the Class Picture the open grave is emphasised, as also are the two diagonal lines pushing outward from the interior of the grave to the corners of the picture.

The subject, when divested of all its trappings and incident, is really: *Christ is Risen*. Does not this little diagram express this with conviction and simplicity? Is it not the exact formula which conveys in the fewest possible strokes *Christ is Risen*? And so we find that the very shape and plan of the design itself embodies the message of the picture; and that there shall be no doubt about it, this V-shape arising from the open grave is repeated at the bottom below the sleeping figures, as a main line frequently is repeated to give it emphasis. The whole design is a sort of *ideograph* or picture writing, and if you can draw something of that kind, your picture cannot fail to express what you intend it to say.

From these eleven pictures three stand out as being different in kind: the Hokusai *Great Wave*; Turner's *Ulysses and Polyphemus*, and Greco's *Agony in the Garden*. These are truly imaginative pictures. The

Hokusai is something extracted from nature, reshaped and moulded by the artist's mind into forms more dynamic, powerful and magnificent. Turner does things in much the same way, and in his picture he adds something that none of our other pictures possess—mystery. Greco goes further than anyone. His imagination and invention were so far in advance of his time that we are only just beginning to see the paths to which they lead.

As we have on several occasions asked that pictures should be imaginative, we must endeavour to say why. In art the Oriental has gone quietly his own way. In the West for several centuries, particularly since the invention of oil painting, man's chief aim has been to make pictures more and more real, more like nature, and more convincing. Even when Vermeer brings that ideal to perfection in the small picture, there is still the outdoor world to conquer. The impressionist painters led us off to brighter colour and light and fresh air and space. Photography gives us an easy way of getting natural pictures, and that ideal which has largely governed some six centuries is now practically perfected by the cinema and television. But though these have added greatly to our interest and amusement, they do not satisfactorily fill the demands made by art.

Moreover, we have a feeling that the movement has been in the wrong direction. We look at the work of the Orient, the primitive races, and a few individuals whose work stands out from the crowd, and realise that there still remains a world of endeavour as yet unchartered and but little explored. That world does not lie in the world outside, but in man's mind. Man alone of all created things has memory, imagination and creative power. The artist can compete with the camera, but why continue to do so when that full cycle of achievement has been realised? It is significant that Walt Disney's creations, which are designed and drawn, are far ahead of the general run of photographic films.

PICTURE MAKING WITH A CAMERA



The view-finder.—The universal pleasure derived from taking photographs is a ready inducement to run a school Camera Club. The following talks are mainly concerned with the pictorial aspect of the work, for it is in this branch that amateurs need the most help and guidance. The mechanical parts of the work—developing, printing, mounting—are not dealt with, as it is unlikely for anyone to attempt to run a Camera Club without having some knowledge of this work and without demonstrating the various processes to the children.

The cameras of most of the members of the Camera Club will probably be small and inexpensive—Brownies, Kodaks, and

Ensigns. These will take quite good photographs, capable of enlargement. Naturally, these simple cameras will not do anything and everything. They have limitations and it is only by keeping within those limitations that one can be sure of satisfactory results.

A good plan is to go out for the first time or two without any films in the camera. Look in the view-finder at everything and press the button whenever something worth taking is found. Learning just what the camera will do, finding out how it works, and getting the feel of things, is half the battle. The view-finder will be one of three kinds, Plate II. Whichever it is, it will

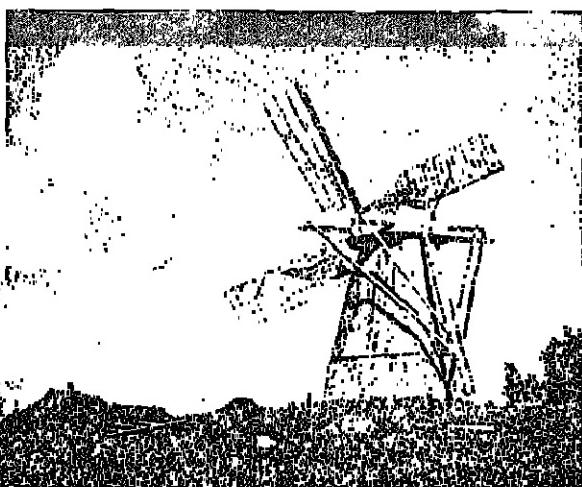
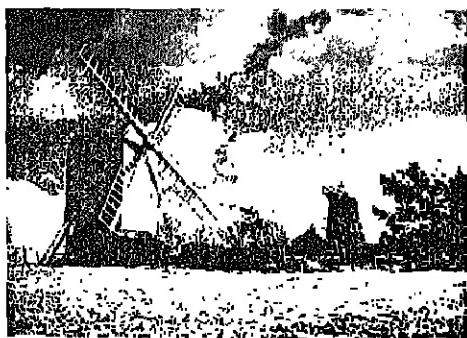
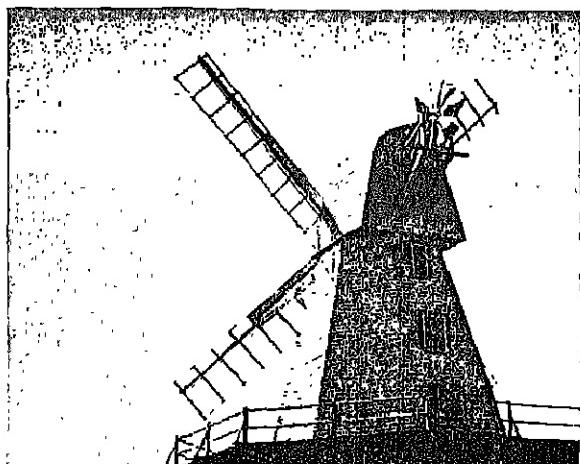
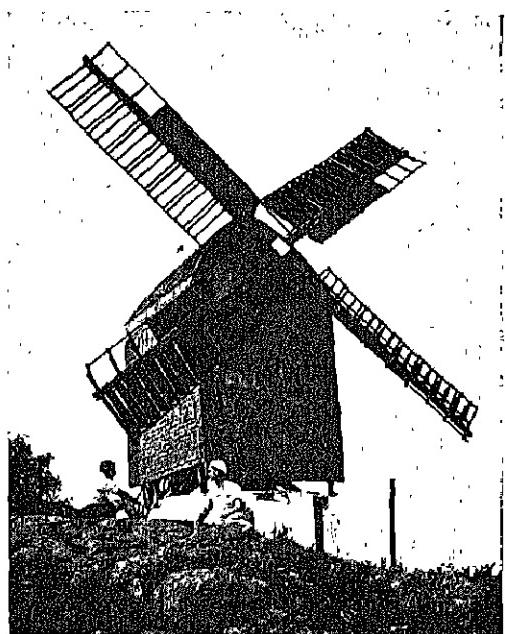


PLATE I. A PAGE OF WINDMILLS

The two top right photographs are reproduced by courtesy of Kodak Ltd.; the other three photographs by the courtesy of Ilford Ltd.

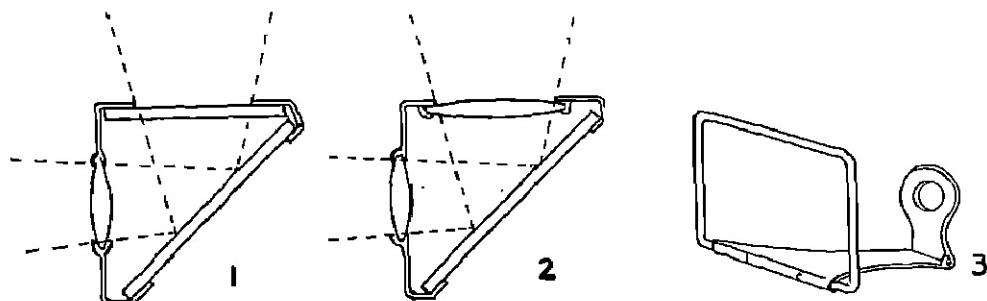


PLATE II. THE THREE TYPES OF VIEW-FINDER

show clearly a tiny picture of what will be produced on the film.

The three kinds of view-finder are: (1) the ground glass; (2) the brilliant; and (3) the metal frame. No. 1 has a small lens in front; at the back, a mirror, sloping at an angle, casts the image of what is seen by the lens on to a piece of ground glass. Sometimes it has a hood, but mostly it is necessary to screen the lens with the hand to cut out the top light. No. 2 has a second and larger lens which takes the place of the ground glass. This gives a brighter picture than the ground glass. A lens of this type is called a "brilliant" view-finder. No. 3 has neither lens nor mirror. It consists of a metal frame having attached a separate flat piece of metal with a hole in it. This hole is exactly opposite the centre of the opening in the metal frame, so that when the eye is put to the hole to look through it, one sees exactly the extent of the view that will be included on the film.

If the camera is of the box type, it will probably have two ground glass view-finders, one for oblong and one for upright pictures.

A camera of the folding type may have a brilliant view-finder which is pivoted to turn over when the camera is reversed for a picture in the other position.

Quite a number of cameras of the simple kind, and also of the elaborate and expensive kind, are now fitted with view-finders which consist of two flat metal plates that lie flat on the camera, but open each to a vertical position when in use. The front plate has

a larger opening than the one nearest the eye, but both are exactly in proportion. The outlines of the two openings must coincide when looking at a view. They should look like Fig. 1 and not like Fig. 2,



FIG. 1.



FIG. 2.

or there will be more picture on one side and at one end than is seen in the actual view. The small square being nearer the eye will be fuzzy in outline, but that presents no difficulty. After a little practice one instinctively adjusts the position of the camera so that the eye gets the two frames together correctly with the view. All these view-finders are made as simple as it is possible for them to be but a great deal depends on a right use of them, so it is necessary to get into the habit of making sure that the exact picture required is seen through the view-finder.

Many people use a camera in much the same way as they would use a gun. In sighting an object they train the sights on the centre of the target—which, in this case, is their view-finder—and then press the button, which represents the trigger of the gun. In this way they get good enough photographs, but they are not always pictures.

The whole business of picture making lies in being able to see a picture "as a whole"

and not as a particular object with a background, or in a setting. Fortunately, the small sized picture on the view-finder helps one to lose objects as separate things, and enables one to concentrate on the whole view.

Picture of windmills.—Now let us suppose that we are going to take a picture of a windmill. Our main business is to watch the pattern shown on the view-finder.

No. 1. (Plate III). Here is an open landscape with a windmill in the distance, but it is too far away; on the view-finder it seems a tiny speck. If there happened to be a good sky with clouds piling up, this view might be well worth taking. As there are only a few wisps of cloud showing, we go nearer to see what a closer view looks like.

No. 2. Here we can see that there is a barn and haystacks on one side and the farmhouse on the other. These offer ample material from which to choose, and as the lighting is right, i.e., from the side on which we look at these groups of buildings, we will try one or two arrangements of composition—for everything in picture making depends on what is included and how it is placed within the picture space. At least one should always avoid putting any important object right in the centre of the picture.

No. 3. A closer view cuts off the tops of the sweeps. Does that matter? Well, we have an instinctive feeling that the whole of an object should be included, but we need not be too precise in such matters. Balance is much more important. Provided the scene composes well, there is no real reason why we should include every part. We cannot go too near, however, for if the mill happens to be working, the sweeps may go round so quickly that the photograph will show signs of the movement.

No. 4 (Plate IV). We can try getting in

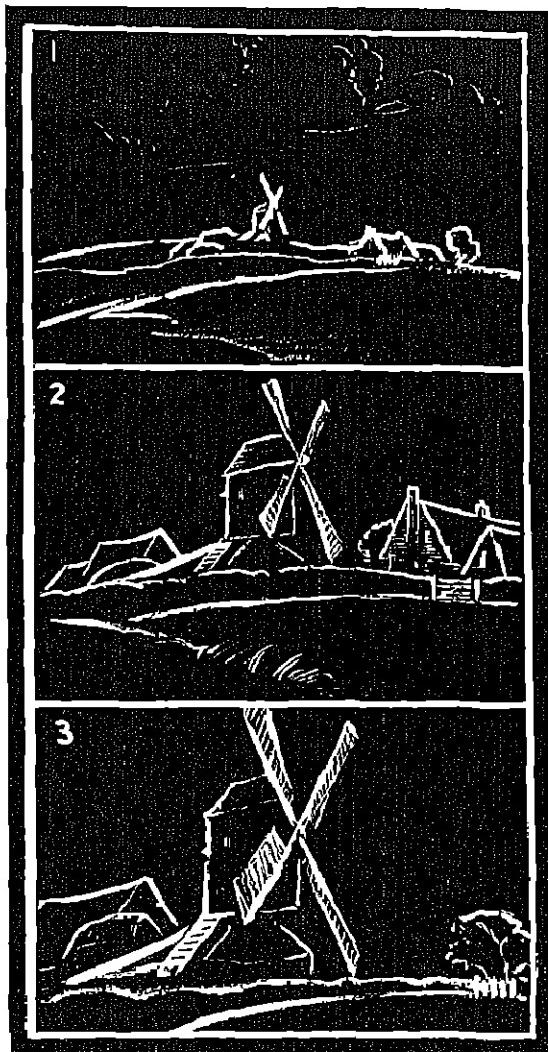


PLATE III. EXPERIMENTS IN COMPOSITION WITH A WINDMILL

all the windmill on an upright view by turning the camera. This view makes it definitely a "portrait" of a windmill. Being a very picturesque object it looks quite well, but like any other portrait, it is taken for its own particular interest and is only vaguely related to its setting—the country round it and its neighbouring buildings.

No. 5. A part of the mill may make quite an interesting view. It gives a big, vigorous,

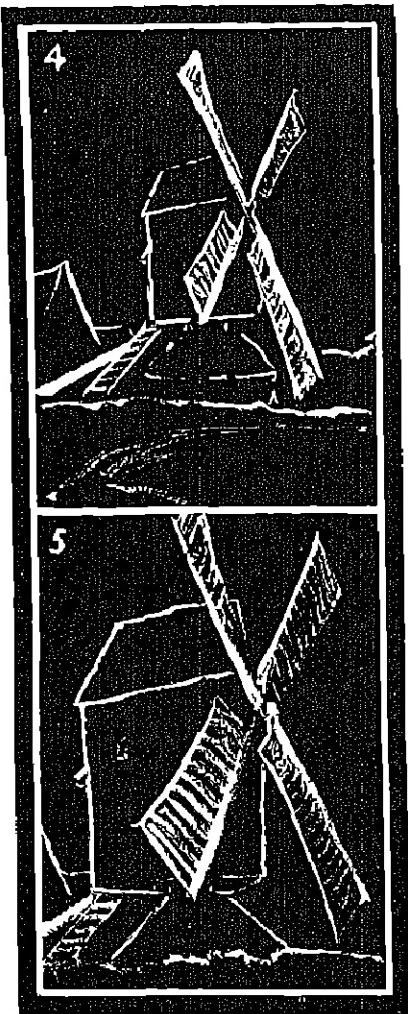


PLATE IV. UPRIGHT VIEWS OF WINDMILLS

pleasing pattern. Long lines and big shapes are the things one should look for on a view-finder, so a windmill is a good object on which to practise composition, for it usually has a few well-ordered shapes in sufficient variety. Walk all round the mill and compare the different points of view, and, if possible, do that at different times of the day to see how lighting alters the effect.

No. 6 (Plate V). When our interest becomes centred on an object, we tend to place it in the middle of the view-finder as in Nos. 1, 2, 3 (Plate III). It has already been noted that this is inadvisable. The main object looks best at a point between two-thirds and three-quarters from either end. In No. 6 we have the mill facing into the picture.

No. 7. Here the mill is facing outwards. Generally we prefer an object to face inwards to the centre, but in this case the lines flow upward towards the mill and give it greater importance. The whole picture has good flowing lines and a simple grouping of shapes, which are well distributed. We are not concerned with them as three separate groups—hill, farm, and haystacks. We watch the balance of pattern all the time to see how the picture composes.

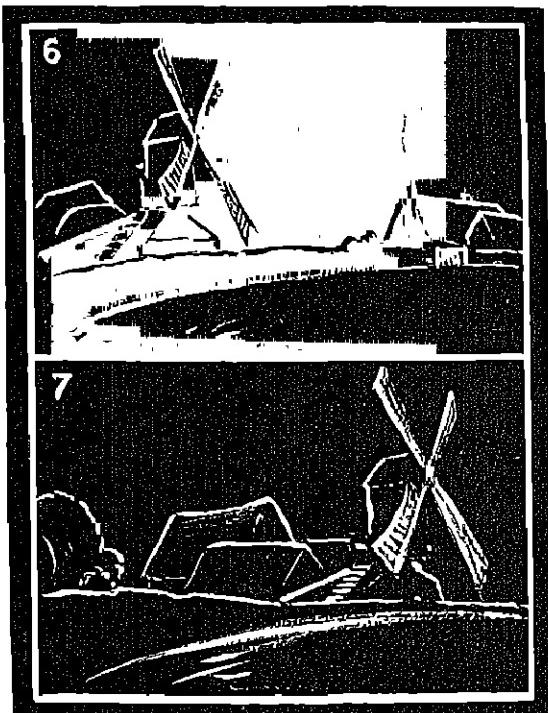


PLATE V. THE PLACING OF THE MILL WITHIN THE PICTURE SPACE

Balance in a picture is the distribution of black and white spaces, as is seen on Plate VI. Imagine the black parts cut out

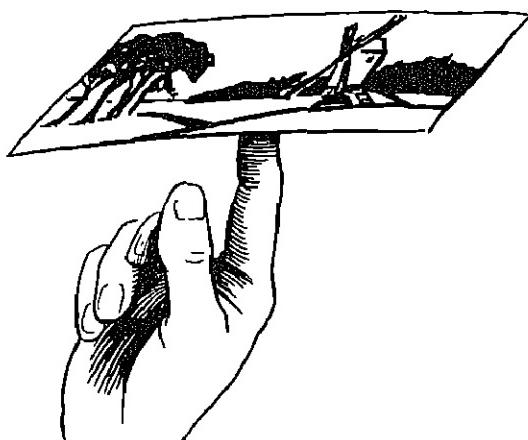


PLATE VI. THE PRINCIPLE OF BALANCE

in thin sheet lead and placed in position on a piece of white card. If the largest mass (the clump of trees) were not balanced by the dark piece on the right, the card would tip over to the left. Balance is most important. By bearing this fact in mind, the amateur will be halfway towards getting pictorial results from snapshots.

Now look over the "Page of Windmills," Plate I. Note what fine patterns they make against the sky and how important the sky becomes in the picture. A windmill is so closely related to wind and weather that we feel an instinctive necessity for big cloud shapes to convey a sense of breeze and movement to the scene. Having composed the picture and decided on the best position, and the exact amount of the view to be included, sit down and watch until the clouds assume some definite form which makes a good balance to the landscape and mill. Do not make hurried snaps, but watch carefully and get things rightly placed. The time will be well spent, for by so doing you will be training yourself to notice things you have not been in the habit of noting.

The valley form.—One of the commonest faults made by amateur photographers is

causing movement of the camera. Pressing the button seems such a simple thing to do that many people take no care to do it in the right way, and they spoil many films in consequence. If the habit is acquired of doing it properly, one can rely on good technical results. There is nothing difficult about the matter. The camera should be pressed against the body in such a way as to leave the view-finder clearly visible. Plant the feet firmly and keep the elbows well into the sides; breathe out, breathe in, and then hold the breath as you press the release of the shutter. Learn to make the movement of release steadily and firmly, and without any jerk. The pressure simply releases a spring, and whether one moves slowly or quickly, steadily or jerkily, it neither hastens nor retards the exposure.

Bearing that in mind, and having a determination to practise it on every occasion, we continue our exploration of the scenes to be found in the view-finder.

No. 1. (Plate VII). Down the valley is a farm which promises interesting material for a photograph. From here one gets a general view, which on the view-finder is not large enough to distinguish. No doubt we should be near enough for a general view, but it is hardly pictorial as all the incident huddles together in the middle of the picture, and the rest is broad open space broken only by lines of hedge and fence and footpath.

No. 2. As we draw nearer we gradually get lower, and so lose that slight elevation which allows us to look down on the scene. In compensation for this, objects loom up more boldly and there is still sufficient rise and fall to the ground to give good foreground lines. A fine old tree catches the eye. Can we make a picture here? Not on this side, for we have nothing on the right-hand side of the view to balance the tree. Even with a good sky this kind of view is likely to be unbalanced.

No. 3. If we move round, we may be able to adjust this by getting the farmhouse on the right. This fills the picture space with

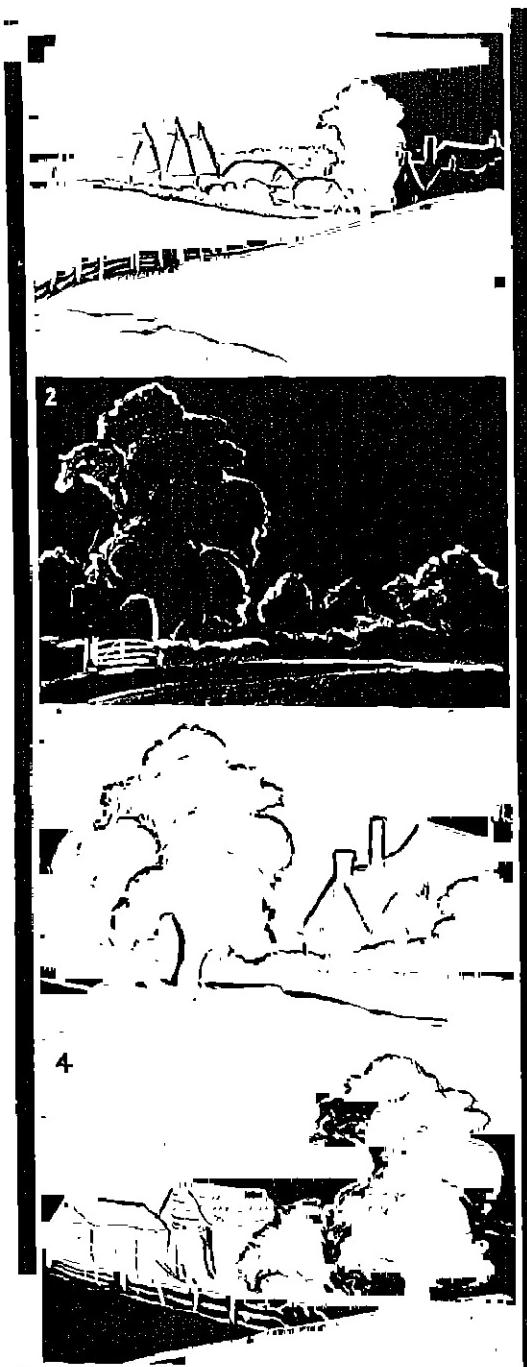


PLATE VII. COMPOSITION

The views round a farm.



PLATE VIII. COMPOSITION

The views round a farm.

more evenly distributed masses. Try to forget what these masses actually are—tree, farmhouse, fields and sky—and look at them as patterns and shapes. Watch the silhouettes and see how the shapes balance each other.

No. 4. We turn our camera more to the left, and again there is a lack of balance. The sheds in themselves are uninteresting and the lines of fence and foreground offer no possibilities. So we go on toward the oast houses. We are now on the far side of the tree, looking at the other side of it. This part of the farm offers better choice of material. On the one side are the oast houses and on the other a group of barns, the real interest of which lies in the variation of the shapes they provide.

No. 5. (Plate VIII). Here is a pleasing little view—the quaint shaped oast houses in which hops are dried; the barn with store places and carts below, and above, the room where the hops are stored and packed into long sacks. Where such an interesting subject is found, it is well to make the most of it. Move to left and right, and see how the view closes into or opens out from the centre. Then move back a few steps and see how the relative heights of objects alter. Then take a few steps and see how near objects increase rapidly in size. If you can find something on which to stand, see how this may give a more spacious foreground.

No. 6. Turning the camera to the left, we get the tree on the right-hand side, and on the other side a view of barns and haystacks. Here we have to take care that we do not get our picture divided down the middle by the line of the tree, making one half barn and the other tree. By moving back a little, and accommodating the size of the tree to the buildings, we may be able to secure a view that avoids these faults which are purposely shown in the drawing.

No. 7. We can get a nearer view, including only the lower part of the tree, with the ends of the barns, the five barred gate and the pathway leading in. This kind of view gives a bigger pattern with a few simple

shapes, and for that reason is more likely to be pictorial. It becomes a selection from nature, rather than an attempt to show a complete view of all the picturesque features.

No. 8. As we return home, we look back for a last glimpse of the farmstead; almost like a part of our first view of it. We note that it might look well in the light on a late afternoon or evening, particularly if there happened to be a pictorial sky. There will be several things at a farm like this that we may want to see again under varying conditions of weather.

In all these pictures the tree has been the dominating object. We have walked all round it and viewed other objects in relation to it. It has been a part of all our pictures, yet except from a pictorial point of view, one would not have noticed it at all. We have purposely omitted any sign of life about the farm. Our pictures show it as completely deserted—no people, no work of any kind going on, no animals or birds anywhere. This has been done to direct the attention to the importance of choosing the landscape and composing the pictures first. Later on, figures in landscape can be considered, but unless one has some idea of the landscape art, figures are not likely to be in the right places, or even in the right settings.

Everything has its own individual shape which is an expression of its nature and character. Those shapes, some moving, some still, are continually grouping before our eyes. When we make a picture, we have to select which objects and which scenes we want to take, and the simplest way is to look at it all as *pattern*, forgetting for a time that it is a boat, or a building, or an animal or a person, or whatever it may be. All nature is pattern, and *all pattern is dark against light, or light against dark*, Plate IX.

A boat on the seashore.—No. 1. (Plate X). This subject "A Boat on the Seashore" has been chosen because in the two previous examples—"A Windmill" and "A Tree"—one could walk all round or go right up to

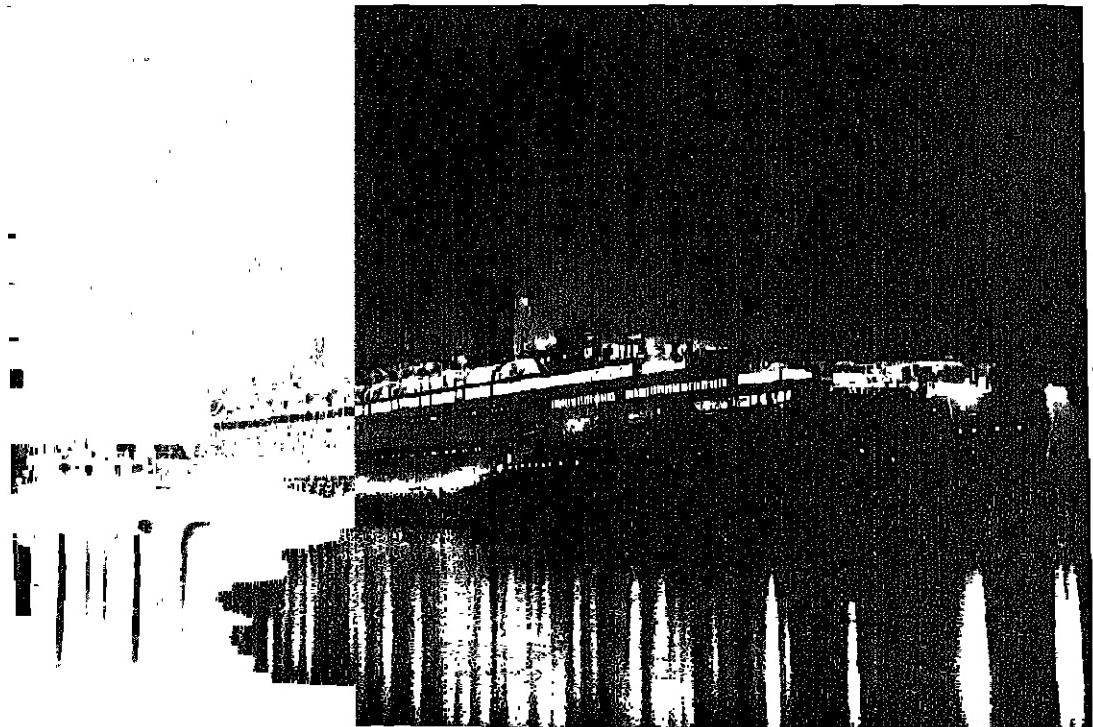


PLATE IX. DARK AGAINST LIGHT, AND LIGHT AGAINST DARK
Both these photographs are reproduced by courtesy of Kodak Ltd.

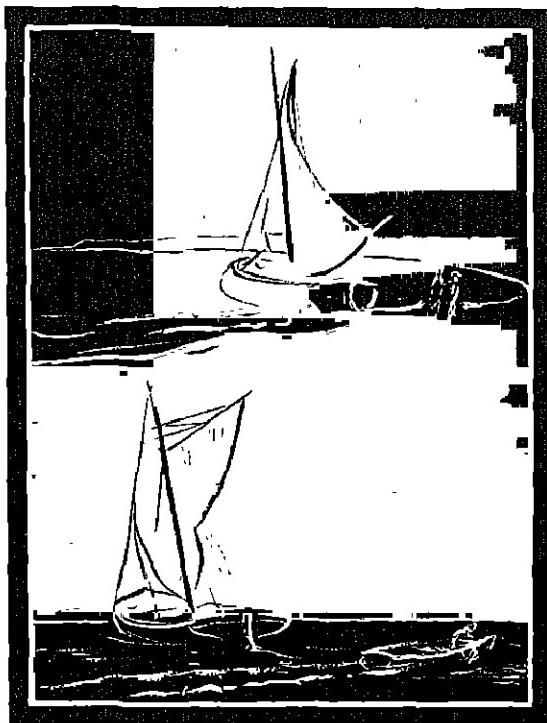


PLATE X. COMPOSITION
A boat on the sea shore.

them. With a boat one usually has a much more restricted view point. Often there are only one or two places from which any view is to be obtained. We have selected boats that are not moving, but lying aground, or anchored a little way out. Note how dismal and forlorn the first one looks, right in the middle of the picture.

No. 2. This is a better view. The boat is on one side and has the rowing boat to balance it. She looks as though she were waiting for the tide.

No. 3. (Plate XI). By taking an upright view, and by going right to the water's edge one can often get pleasing reflections broken by the long lines of the incoming tide. As the interest is mainly in this lower part of the picture, one need not include all the mast and sail. Watch the flow of the lines and the balance of pattern.

No. 4. If you can manage to get two sails into the picture, one should be used to balance the other, and if one is much nearer than the other it will give depth and space, and a feeling of distance.

No. 5. (Plate XII). Near views give bigger shapes and longer lines and so are more striking in design as can be seen in the stern of this Thames barge, lying at a wharf. Note how the big shapes on this and the

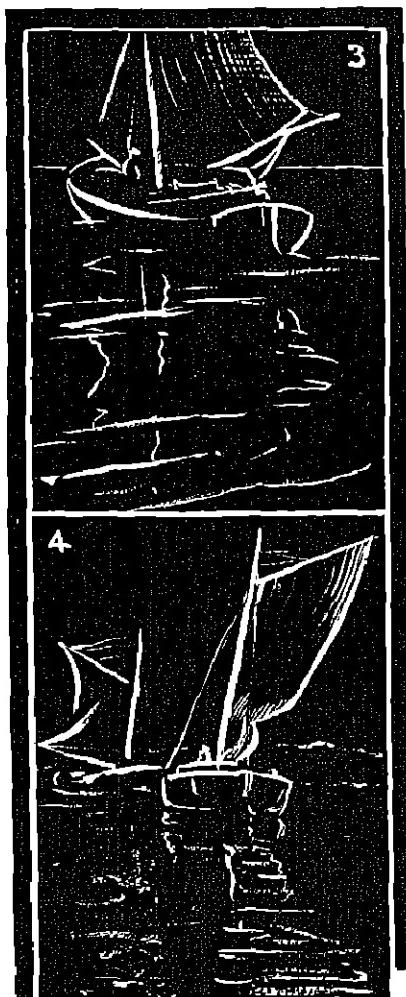


PLATE XI. COMPOSITION
Upright views of boats.

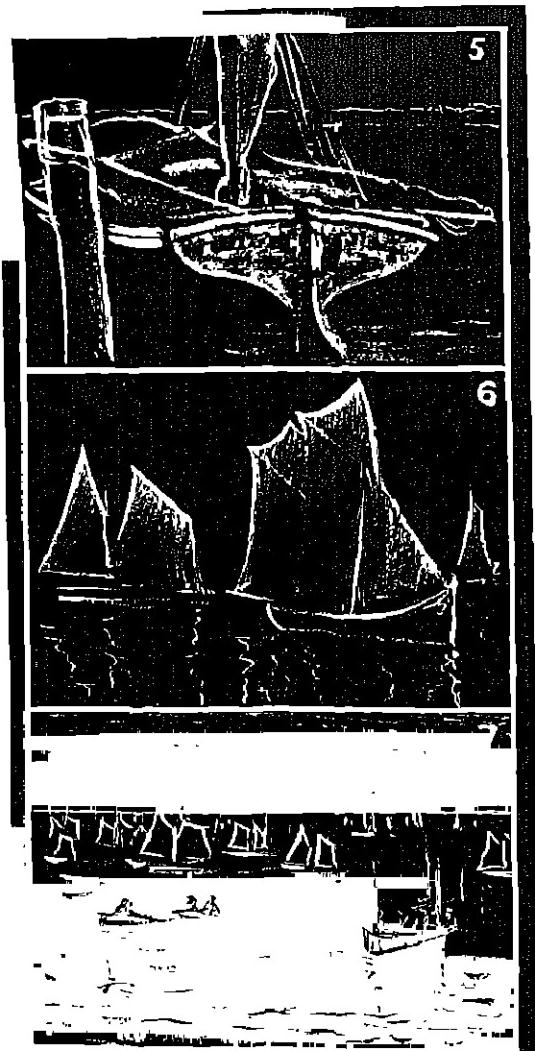


PLATE XII. COMPOSITION
Long lines and large shapes are best.

next sketch make them appear much more important than No. 7.

No. 6. Here the outline shape has been emphasised. This is the silhouette. Big shapes give dignity and boldness.

No. 7. In contrast with the two previous views, this looks small and rather niggling. Small patterns dotted all over the picture

generally give an insignificant effect. Really, it is attempting too much on a small film. Look on the view-finder for big simple shapes and long lines.

Notice in Plate XIII how well the three barges have been placed. The nearer one comes exactly in the right position in the picture space. The one beyond that fills in and completes that side, so that these two form one group which is balanced by the third barge on the left, while a fourth, which is much farther away joins the scene with the edge of the photograph. The low horizontal line of wharves and buildings and the fine sky add to the brightness and sparkle, so that the whole scene is full of life, vitality and movement.

The lower view on Plate XIII is in a different mood — rather sombre and dramatic. The whole interest is centred on the sky and its reflections on the water. It is a fine snapshot that has a definite "mood" which is well conveyed. It is not, however, so successful in construction as the former picture. It has the appearance of having been taken a second or two on the late side, for the steamer appears to be moving out of the picture. The intention of showing the two boats distinctly clear of each other has resulted in giving an equal size and importance to each. Even the extraordinary sky cannot distract one's attention from a lack of balance in design. One should not have two subjects of equal importance in a view.

Light the governing factor in photography.—The first two really important matters to be remembered in all camera studies are (1) watch the pattern on the view-finder, and (2) hold the camera steady when pressing the button.

The third point is, learn to estimate the amount of light in the view.

Correct exposure is essential for good photography. This talk deals with open seascapes and clouds and broad open spaces where there is light and air and fresh breezes.

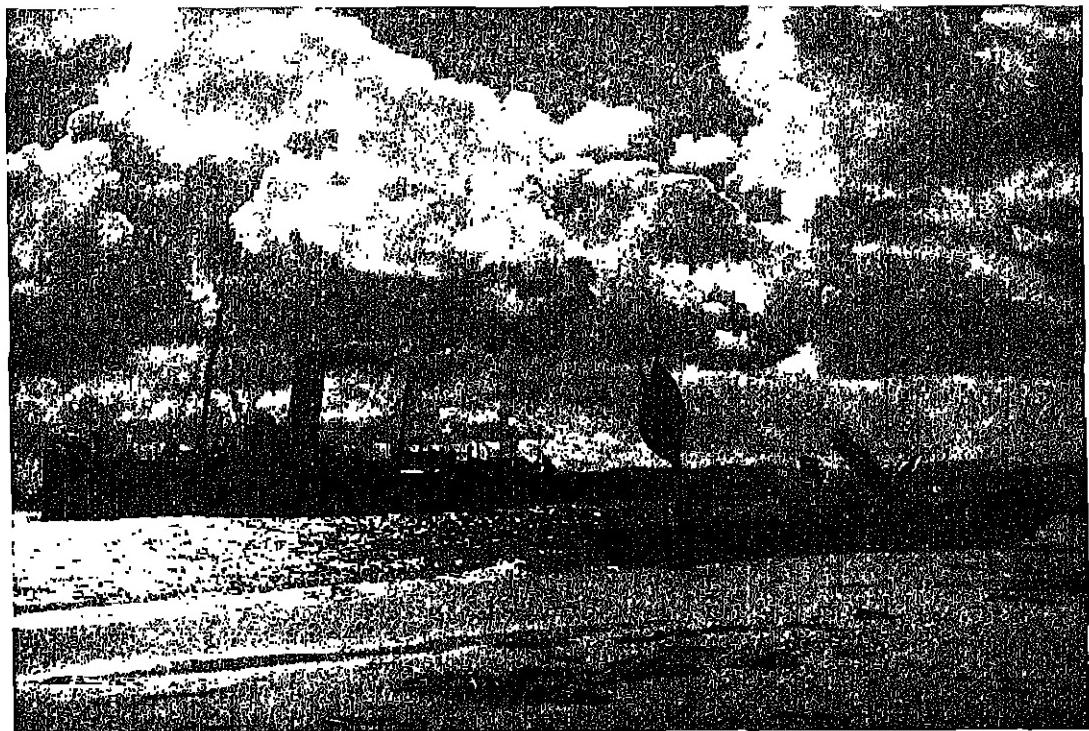
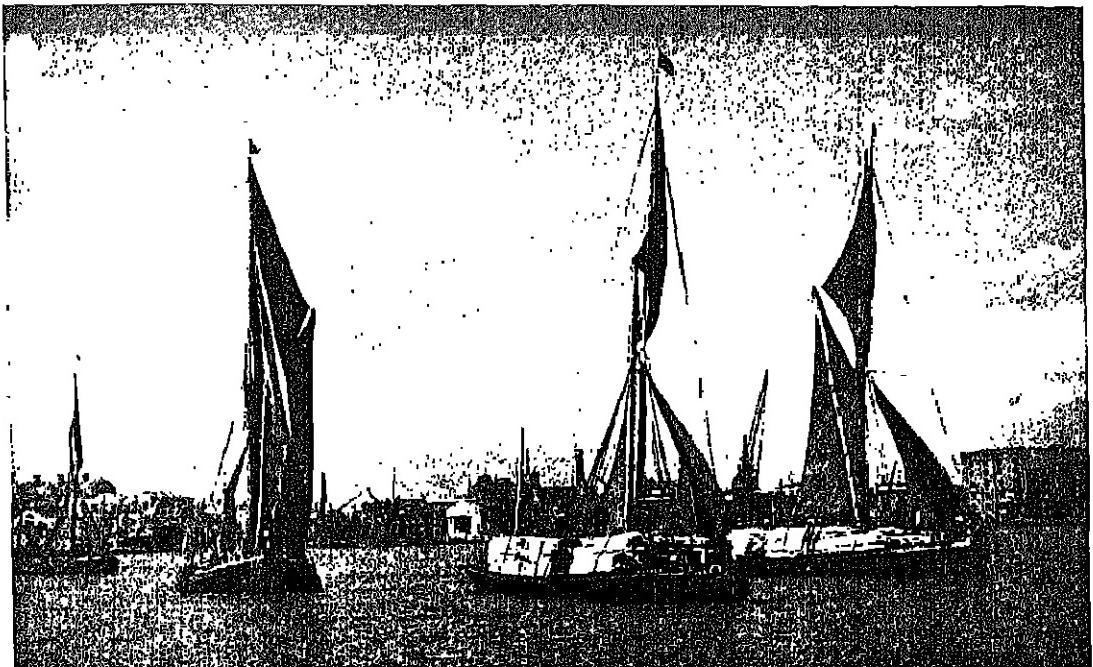


PLATE XIII. TWO SNAPSHOT SHOWING CONTRASTING MOODS

The top photograph is reproduced by courtesy of Kodak Ltd.; the lower photograph by courtesy of Ilford Ltd.

Open seascape comes first because there, at most times of the year, one can safely make an exposure and get proper results, for sea scenes have most light in them.

Where there is a big expanse of light, it is obvious that exposure can be short. One

may, however, fail to realise how much more light there is at the sea than in open country round towns and villages. The main reason is that the air near the sea is clearer and the light more actinic—it has more effect on the sensitised film.

LIGHT TABLE OF COMPARATIVE EXPOSURES

Here is a list of subjects each requiring a different exposure. The groups are arranged in ascending order of time or length of exposure. Thus, if you fairly accurately calculate the exposure needed on a certain day using a particular stop for No. (2), you can at once calculate the exposure needed for any other subject by multiplying the exposure by 2, 4 and so on, according to the subject.

(1) Cloud studies and open seascapes.	$\frac{1}{2}$
(2) Open landscape, shipping studies, beach scenes.	1
(3) Ordinary landscapes with buildings, cattle, figures, etc., not too near the camera.	2 times
(4) Landscapes with dark foreground, street scenes.	4 times
(5) Buildings or dark trees.	6 to 8 times
(6) Interiors.	10 to 40 or more times
(7) Portraits or groups taken out of doors.	10 times
(8) Portraits in a well-lighted room.	60 times

Light is the governing factor in photography. At the seashore on a bright day, the whole scene around is filled with light. It is the lightest possible general scheme, with, perhaps, a few spots of dark—a boat or two, rocks, one or two little figures, a fisherman's hut—all of which will stand out as dark incidents against a light background. On a bright sunny day in summer, the ordinary instantaneous exposure would be more than should be given to such a scene. It would be over-exposure.

This is where the *stops* of the lens are made use of. On most of the inexpensive cameras the largest aperture is F 11. The others may be marked F 16 and F 22. F 16 gives half the exposure of F 11. F 22 gives half the exposure of F 16. All lens apertures are arranged in this way, so that the one above gives double the exposure of the one below. The larger the number, the smaller the stop.

If the full aperture on the camera is F 11, the shutter speed is about 1/25th of a second.

Then F 16 gives one half of 1/25th, that is, 1/50th of a second. F 22 gives 1/100th of a second.

As 1/100th of a second would be about the right exposure for open seascapes, this small stop, F 22, can safely be used on a bright summer day for this subject and also for cloud studies. The rule is simple: *The brighter the light, the smaller the stop.*

Seascapes.—We can now consider a few common faults in pictures taken by the sea.

No. 1 (Plate XIV). This is the average view from the beach at any seaside town. Usually there are rows of groins on a sloping beach. These views are rarely successful pictorially, as the eye, instead of going forward into the picture, is all the time being directed toward the lower right-hand corner. Occasionally, a boat or a sail can be found to stop the sweep of these lines and keep the eye in the picture. Otherwise all the small pattern tends to centre

toward the top left-hand corner. Leading lines must run into and not out of a picture.

No. 2. One feeling to try to get into any view of the sea is that of space, and so one needs a three dimensional effect. A jetty or harbour walls convey the feeling that one could walk right out to the end. If one can get some part of the foreground to come up sharp and clear, with the far part softer and melting into the distance, that will help to give this feeling. Far more certainly, the effect can be obtained by the main lines leading in. Those are the lines to be looked for and included in camera studies.

No. 3. This sketch shows the effect of lines leading into the picture. The view has no point of interest and no specially attractive features; it relies on its lines and tones to give the feeling of space and distance and a sense of freedom and solitude. These very simple subjects afford one of the best ways of studying composition, for here one must watch the lines and the spacing, and by so doing realise that these form the basis of all satisfying pictures.

The view-finder shows such a tiny picture, that there is some difficulty in following these lines, so the view itself must be observed in order to decide whether the lines are sufficiently marked to appear on the finished print. Watch the view and move a little this way and that until the foreground lines all flow in the same direction toward the distance. The movement of a few inches to left or right may make all the difference.

No. 4 (Plate XV). A rocky headland or cliffs often present difficulties at first sight. Avoid anything like an equal balance of land and sea. The big curves of the bay or inlet usually attract, so see that full use is made of its sweep and flow. If it is contrasted (as it is here) with sharp angular cliffs, other sharp angles on a smaller scale should (if possible) be utilised to balance the whole. Make the most of any near rocks in order to get a firm substantial foreground.

In No. 5 the dotted line shows the picture divided equally in two. Such bad composition is easily avoided once it has been pointed

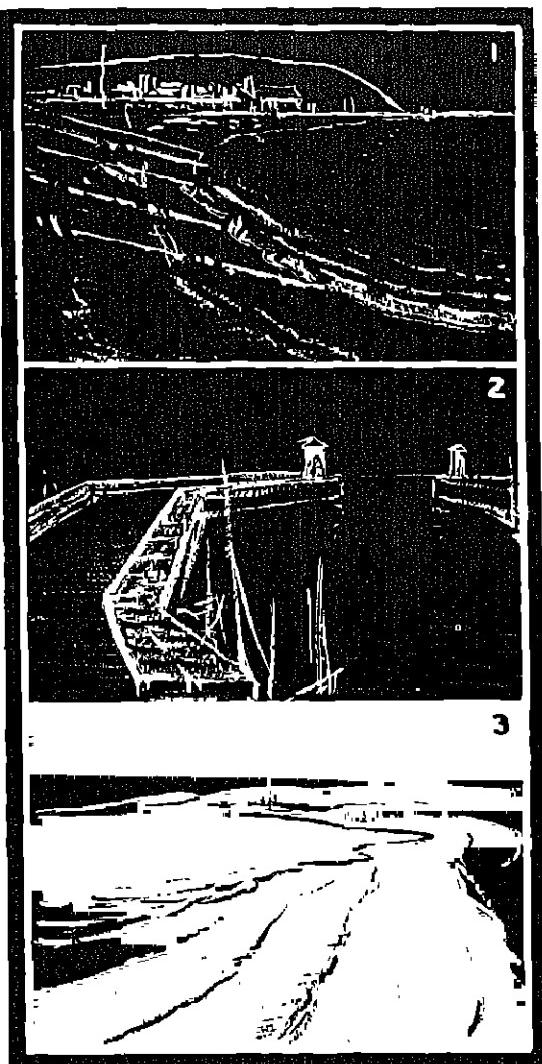


PLATE XIV. COMPOSITION
Open seascape.

out. It is necessary to decide which is the more important (pictorially)—the sea, or the land. Also, watch the light and the shade and make a balance of light and dark.

No. 6. This is a still more important example, for it is divided into four—one quarter cliff, one quarter sky, one quarter sea and sand and one quarter reflections. Yet one often sees snapshots with very much

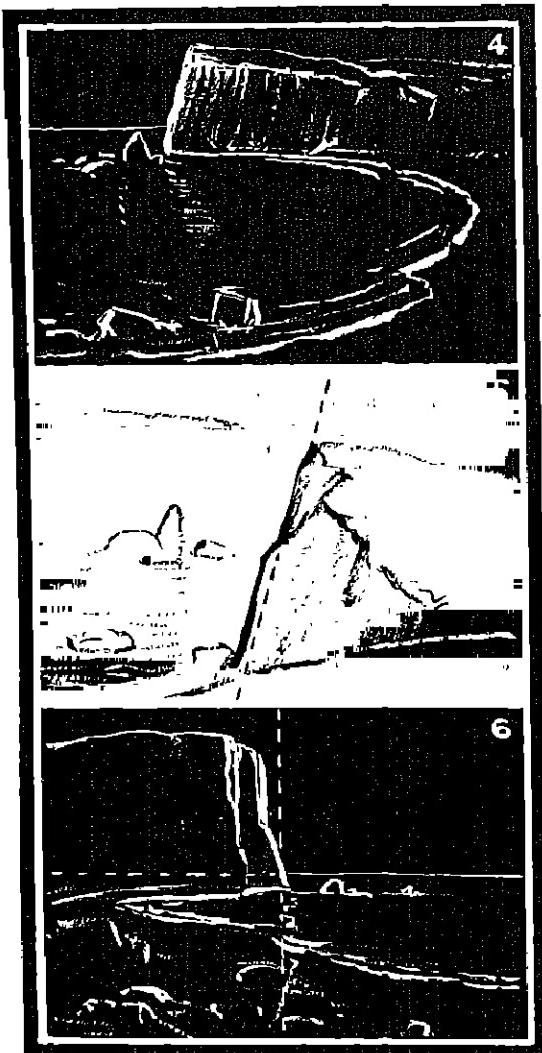


PLATE XV. COMPOSITION
SEA AND COAST.

these proportions. Avoid anything like equal proportions. One part out of four must surely be of more importance than the others. If a seascape is composed like this, no boats or figures or incident can compensate for such symmetrical arrangement.

The exposures for an open landscape which includes, for instance, a clump of trees or a farmhouse in the middle distance,

would be approximately twice that required for a seascape. The stop to be used on a bright summer day would thus be F 16 instead of F 22. The same exposure would be right for a mountain scene, if it did not include too much heavily wooded slopes.

This little picture of sand dunes, Plate XVI is a particular example of the difficulties of judging exposure. It is a subject full of light with a very dark and heavy mass in it. If we expose for the dark mass, the sky, sands and shadows will be over-exposed. If we give a brief exposure for the light parts, the dark mass will be a solid dark with no light in it. With a camera having a very limited number of stops, it is always advisable to avoid taking subjects having excessive contrasts. The modern films help very much to balance out the lights and darks, but unless one can use a colour filter and a panchromatic plate, it would be better to choose a somewhat similar clump of grass which was less dense.

One further note about exposure. If F 22 is the stop to use on a bright summer day, it should be clear that when the sun is overcast, when it is dull or slightly misty, etc., the stop must gradually be opened (according to the judged intensity of the light) to F 16 or F 11. It is well worth while to study the exposure tables in photographic books and journals; there are, too, most useful meters, but both leave a good deal to individual judgment. The main rule is: *Do not under-expose.*

Figures in landscapes.—There are some subjects that are better without figures, and some scenes where it would be difficult to get the right type of figure for the landscape setting, but we certainly should try to suggest that there is life of some kind in our snapshots, and at least endeavour to rid them of any feeling of emptiness and desolation.

We begin with the ordinary signs of life on a farm—cattle, carts, chickens, ducks, sheep, cows and so on—but we must not make the common mistake of forgetting the



PLATE XVI. SAND DUNES

landscape and concentrating the interest on the figures or animals. Although we are going to talk about birds, animals, and figures, they are to be considered only as very small parts in the landscape. In some cases they may appear hardly more than spots of light or dark, and in any case they will appear little more than half an inch or so in height. Although they are small in size, they are important, for they are points of interest that immediately attract the eye.

Often enough, it takes very little to suggest signs of life; one or two sheep, a farm cart and a few chickens may be all that are needed to add considerably to the interest. If figures are included they must be appropriate to and really form part of the scene. It is useless to get a friend to pose in the picture because

a figure is wanted. The friend will in all probability be quite wrong in that setting. On a farm keep strictly to farm workers; on a beach to one or two old sailors or other appropriate figures.

Note what a difference these groups of cows make to the river scene, Plate XVII. Without them it would have been quite an ordinary view. The bridge alone would hardly have created a centre of interest for it is too far away, but the cows are so well arranged that they lead the eye gently in that direction. We feel them slowly splashing through the shallow water and so imagine the coolness of the stream on a sultry summer afternoon. Pictorially, they not only make up the middle of the picture, but break the long line of the bank; in addition they are conveniently arranged in two balanced groups—the small group on the right balances the larger group and keeps the eye from straying out of the picture. Note particularly that the foreground of the picture is largely made up of the reflection of the trees in the water. Cover the bottom of the photographs as far as the cows and note how the absence of foreground upsets the balance.

No. 1 (Plate XVIII). At the orchard end of the farmhouse was a group of geese sunning themselves by the apple trees. By going through into the orchard we obtained



PLATE XVII. COWS IN SHALLOW WATER

a view of the back of the house, seen partly through the trees, just as the geese began to move. It will be seen how much they add to the liveliness of the picture.

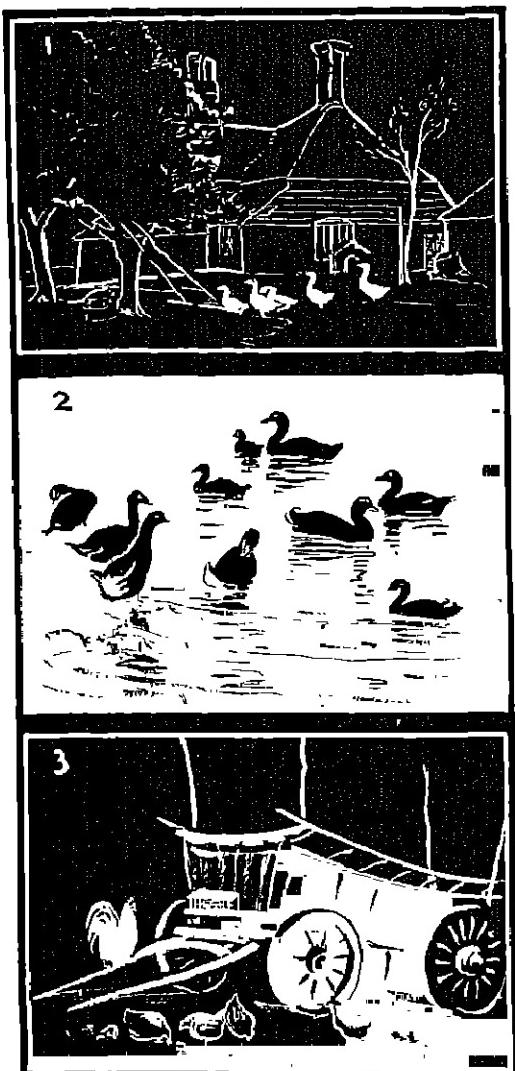


PLATE XVIII. LIFE AND INCIDENT ON A FARM

No. 2. Through the gate to the side of the farmhouse was a pond with ducks on it. This is always a fascinating subject, but it is useless to make one or two hurried

snaps and pass on. Where there is so much movement, the best way to take a picture is to sit down and watch and wait for the ducks to group themselves conveniently. After sitting for a little while, they get used to your presence. When several of them come to the edge of the pond they are more likely to be still or nearly so, and you have then only those swimming to attend to. Keep far enough away so that they all come out much the same size, even if they appear small, otherwise with those in the foreground very large and those in the distance very small, they will appear to be swimming in a lake instead of a pond. Look into the view-finder, watch the pattern and make an exposure only when this looks well balanced. Aim at filling the plate with ducks and take them, or most of them, facing *inwards* to the middle.

No. 3. Outside the cart shed stood a farm waggon—the real old-fashioned hay wain. In Sussex it is called "The Ship of the Downs" for its long curves are somewhat like those of a ship. Being strongly built for heavy loads and rough tracks, it has splendid lines and proportions. With a white cockerel, a few speckled hens, and such a waggon there is all the material for a satisfactory picture. If possible, keep the background simple, get the waggon well placed more to one side than the other, and then watch until the fowls group themselves in an agreeable manner, so that they complete the spotting of pattern. It is not necessary to include the whole waggon in the picture, but care must be taken to see that shafts lead the eye inwards and not outwards. A subject of this kind can be taken from several points of view according to the lighting, for shadows add greatly to the effect.

No. 4 (Plate XIX). There were pigeons flying round the roofs of the oast houses, and as we studied these quaint and interesting shapes of cones and cowls, roofs of tiles and slates, a pigeon settled on the beam over the little dormer opening from which the sacks filled with dried hops are lowered.

Soon another settled on this little porch, and in a few minutes there were half a dozen fairly still, while others circled above. This seemed as fortunate a moment as we were likely to get, so we made a couple of exposures in rapid succession. With the cheapest camera, there is no danger of showing movement of birds flying so long as they are such a distance from the lens as these pigeons were.

No. 5. The cowsheds were picturesque places, but as it was a warm summer afternoon the cows were lying in the shadowed part of their enclosure. Having decided where we wanted the cows, my friend strolled slowly round behind them while I studied the view-finder. As he approached they got on their feet and moved away from him; fortunately they moved in the right direction and we managed to get them well placed. Usually it is better not to try to get animals into any particular position, but to view them from various angles to see if they show well and make a good group against their background. In any case, one must never be in a hurry when taking groups of birds and animals. Quiet movements and patience are essentials to good and satisfactory work of this kind.

No. 6. On several parts of the farm there were fine trees, principally ash and elm. Many were of good shape and well grouped to make attractive pictures, but the field in the lower part of the view was level and uninteresting. When sheep are turned into these fields and are dotted about, some in shadow and some with sunlight outlining them, there is a chance to make a picture or two, for they break up the foreground and give life and movement. It is necessary to watch the lighting and note at what time the sun is in the best position to give big masses of light and shade. Then those small spots of white that the sheep give to the view are sufficient to complete the pattern and round off the interest.

It is the landscape part of the picture which is really important, and the picture seeker must move the camera slowly here

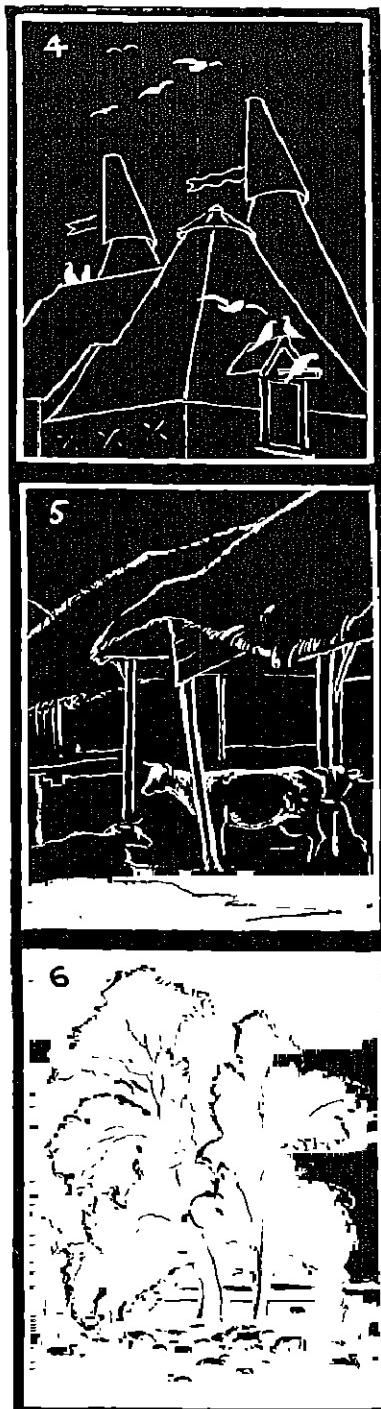


PLATE XIX. LIFE AND INCIDENT
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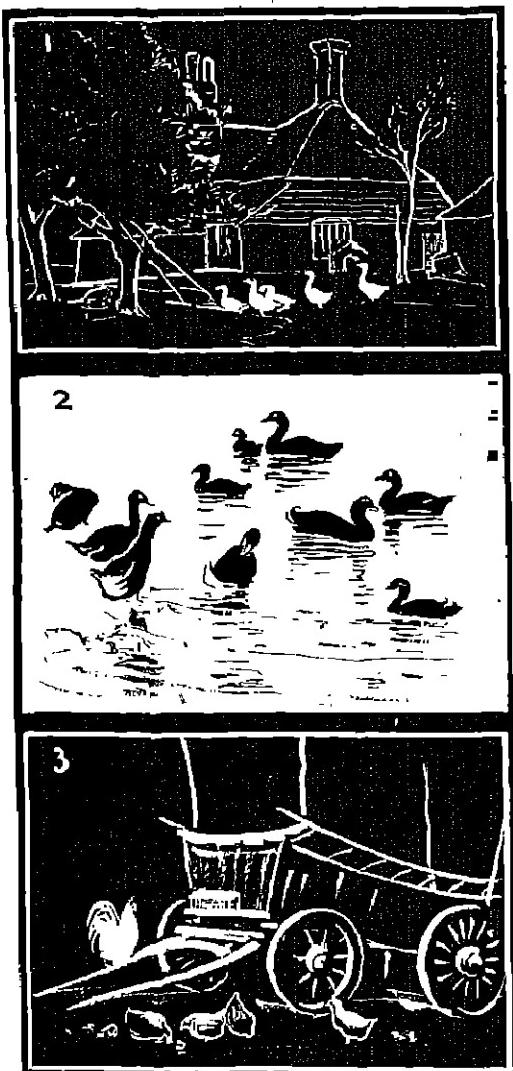


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PLATE XIX. LIFE AND INCIDENT
ON A FARM

and there until the view composes best. Note particularly the exact extent of the part to be included. Once this is determined, the whole attention can be given to the living and moving incidents in the picture. *First compose the view and then attend to the incidents.* Only by doing things in this way is one likely to get complete pictures. The live incident may be small, but it will take its right place in its landscape setting. It is advisable to practice first on groups of animals that are fairly still, before attempting to take moving things.

We will now consider two landscapes with figures in them. This small riverside picture (Plate XX) owes a good deal to the few



PLATE XX. EARLY MORNING ON THE RIVER

small spots recognisable as people. Without them this would have been merely a foggy morning by the river. The presence of the boatman and rowers suggests that it is only morning mists which will clear, and the sun then shine through. The figures alter the whole feeling of the picture. Note the position of the boat off the centre in the middle distance. The foreground largely depends on ripples and the reflections of the poles. It is often necessary when photographing water scenes to throw a stone into the

water immediately before exposure in order to make ripples on the surface.

The quiet river backwater (Plate XXI) would be bright and gay only when there were boats and people there. We share their enjoyment in being part of such a picturesque setting and revel in the coolness and shade of a hot summer afternoon.

In each of these views it is the landscape that is the important part and the figures are only accessories. Always look first to the composition of the landscape. You may have to alter your position slightly to accommodate some incident, but nevertheless it is on the arrangement and composition of the landscape that the effect of the picture depends. The figures are too small to make any difference to the exposure, which is calculated on the general amount of light on the subject and the extent and depth of the darks.

The river landscape with cows and the misty morning on the river would need an exposure of approximately $1/25$ th of a second at full aperture of F 11—the ordinary instantaneous exposure at the largest opening on the lens. On a more expensive camera the lens has a larger full aperture and more stops, as well as a greater range of shutter speeds. With such cameras one is able to make a more exact adjustment of exposure. One is always apt to under expose water scenes because everything looks so bright, hence the rule to expose for the shadows must be strictly observed.

Pictures taken with the cheapest cameras can be as good as those taken with highly elaborate and expensive ones. The real difference between a good picture and a good photograph lies in the ability to select the right pictorial material and compose it effectively in the picture space. Train the eye to see the big lines, the proportions of the masses, and the balance of pattern. Snapshot photography has been made so simple and easy that many people take their views in a haphazard way, trusting to luck to produce a picture. But the hobby becomes so much more interesting, so much more



PLATE XXI. SMALL FIGURES IN A RIVER SCENE

satisfying if one aims always at making pictures as well as taking photographs.

In Plate XXI the trees and figures are darker and nearer to the camera than in the other river scenes, hence it needs more exposure. For an instantaneous exposure one cannot give more than the shutter gives, which is $1/25$ th of a second at the largest aperture of the lens, F 11. If an attempt is made to give a time exposure, the figures will show signs of movement. For such subjects which need more exposure, it is advisable to use a faster (more sensitive) film. Otherwise they may be under exposed, and that would be useless. An under-exposed plate gives hard black and white effects, with no detail in the shadows. Soot and whitewash! Over exposure can be dealt with to a certain extent, for the films and plates have considerable latitude, that is, they will stand a fair amount of over exposure. If the films are under exposed very little can be done with them.

The subjects dealt with so far are all reckoned for exposure on the usual *Rapid*

plates or films. In a cheap camera such plates can be used only in a good light of the brightest part of the day—except at the seaside where the light is usually very actinic.

There are films very much faster than the *Rapid*, and these will be considered later in our talks.

Woodland scenes.—A peep through a vista or a glade is always interesting, as the various objects group one behind the other, leading the eye gently away to the extreme distance.

The three main divisions of all landscapes are: (1) distance; (2) middle distance, and (3) foreground. In a photograph, what the eye sees as distance becomes so insignificant on the film or the print that we need some well-marked objects or shapes in the middle distance. The foreground may in some cases show little actual ground, but the nearer part of the picture is the foreground.

It is not at all an easy matter to say which are the main lines of a scene until the eye has been trained to sort them out.

In Plate XXII it will be seen from the small diagram, No. 1 (Plate XXIV), that it is a pictorial effect in straight lines, but it may not be realised that the effect entirely depends on the shadows cast by the tree trunks. It is these that take the eye right into the picture. They all radiate from a centre which is hidden by the trees in the middle distance. In such a glare of light there is always a tendency to hard contrasts in the negative, and prints are inclined to look rather like snow scenes, so a full exposure is demanded. Notice that the tree trunk in the foreground shows full details of bark, proving that the plate was fully exposed.

Plate XXIII is composed in curves, as can be seen from the diagram sketch No. 2. This gives the scene a less harsh and a quieter and more gentle appeal. The two pictures are entirely different in mood, yet the treatment and arrangement of each is right for its purpose. The soft sunlight glinting on the foliage and the shadow patterns on the ground are all well distributed, and the lens has been screened from the direct rays of sunlight, for the sun is here facing the camera. The scenes are rich in tone, as well as rich and consistent in pattern. Possibly the near tree trunk is rather large; just a step or so farther back would have been better, but in any case it is a very pleasant view of a forest glade. It has no real distance, but as is the way with woods and forests, it opens enticing vistas that intrigue and rouse interest.

Plate XXV is definitely a landscape seen through trees. Here are three well marked planes—the trees form the foreground, the hill slope on the left is the middle distance, and the rise beyond that leads the eye across the level to the low hills beyond.

The diagram No. 3. indicates the general arrangement of the masses. As the foliage of the trees is very dark, there is a little too much weight there, and the picture is a trifle top heavy. But the trees make such a fine group and the suggestion of distance beyond is so complete, that one can easily overlook the fault. We point it out as a

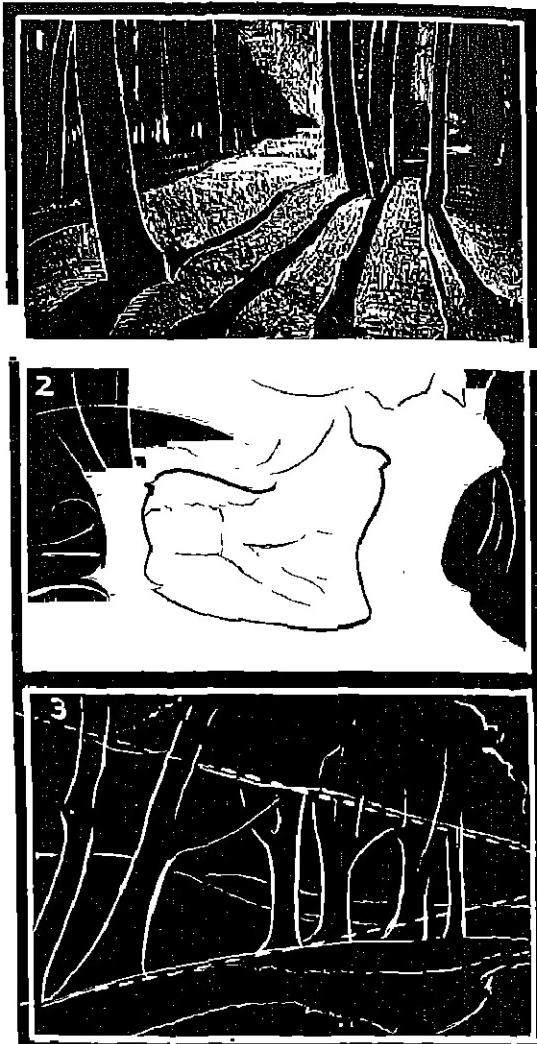


PLATE XXIV. WOODLAND AND LANDSCAPES SEEN THROUGH TREES

reminder to keep the dark masses in the lower and nearer part of the picture, so far as possible.

Plate XXVI is almost an ideal peep through. Diagram No. 4 (Plate XXVII) shows how agreeably all the main lines are disposed. The white building in the distance forms a centre of interest, to which the eye goes instinctively. The foreground and trees are well balanced. The sky and the distance



PLATE XXII. TREE SHADOWS



PLATE XXIII. A WOODLAND GLADE

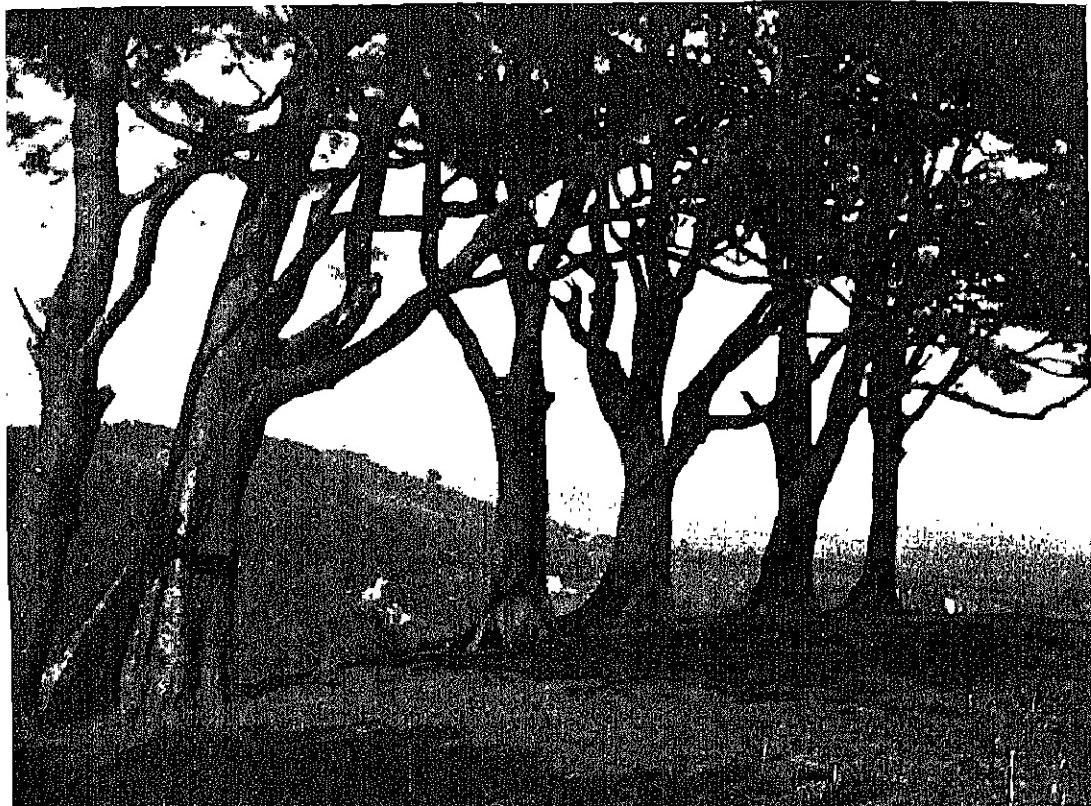


PLATE XXV. LANDSCAPE SEEN THROUGH TREES

are admirable, and the way in which the foreground builds step by step in that direction, could hardly be better.

It is obvious that the photographer was most careful in the selection of his view and his standpoint. Good landscapes like this are seldom lucky flukes, they invariably show that they are the outcome of knowledge and understanding of the basic principles of composition, which can be acquired by giving attention to the lines and masses and pattern.

As a rule it is best for the amateur with a cheap camera to keep to open country and not attempt to take pictures inside woods or under dark, heavy trees. The outskirts of a wood or copse are usually more pictorial than the views amongst the trees. A path through a wood may seem cool, shady and

pleasant, but the eyes quickly adjust themselves to a softer light, and one might imagine that there was ample light for a snapshot. A trial would most certainly prove that the film was under exposed. The light in a wood is mostly reflected light having a greenish tinge which needs considerably more exposure than a view outside the wood.

In order to take satisfactory woodland scenes it is necessary to give a time exposure. For this a tripod is needed for there is rarely anything on which one can rest and steady the camera without getting too low a standpoint. Choose the view carefully, avoiding heavy darks or violent contrasts, and see that the tripod is firmly fixed. With most cameras a time exposure is made by two movements; one to open the shutter, and

one to close it. Naturally the amateur will have made sure how his shutter works and the method of making a time exposure before attempting to take a photograph.

There may be some difficulty in estimating how long a second is. Some people count seconds by saying: "One little second, two little seconds, three little seconds," and so on. Others repeat: "*One and, two and, three and, four and,*" etc. It makes little difference what method of counting is adopted providing that the method is checked by a watch and then employed regularly as needed. Many woodland scenes contain so little light that they may need from 5 to 10 seconds or more according to the stop that is used and the amount of sunlight shining above the wood. It will be seen from the Light Table (p. 492) that the exposure will be at least six times greater than that required for an open landscape.



PLATE XXVI. AN IDEAL PEEP THROUGH



PLATE XXVII. DIAGRAM OF PLATE XXVI

With box type cameras and the simpler folding ones, good snapshots can be taken under conditions when the light is not so bright, at times earlier or later in the day, and even on cloudy and dull days, if faster films than *Rapid* are used. Many fast films are made specially colour sensitive, and these enable one to get skies with clouds in the photographs, as well as giving a correct rendering of the landscape yellows and greens. With ordinary films and plates the blue of the sky is so actinic that it is always over exposed when the exposure for the subject is normal, but with the modern colour corrected films, the rays from the blue are, as it were, held back and so are not over exposed.

Usually, these films are slightly clearer than the ordinary ones, and being more sensitive to light greater care has to be used in loading and unloading the camera.

Among the faster films are *Extra Rapid*, *Ultra Rapid* (still faster), and hypersensitive *Panchromatic* (faster still). A dealer will advise and help in the selection.

During the summer months (June, July and August) in the country or near the sea, on bright days, between the hours of 10 a.m. to 2 p.m., one can safely use the ordinary *Rapid* film, and give the instantaneous exposure for such subjects as have been discussed in earlier talks. But for woodland views the faster films would be much better to use. For more open subjects faster films allow one to extend the time of day from earlier in the morning to later in the afternoon, and to spring and autumn and even in winter if one takes care to choose only the bright clear days and expose at some time about an hour before or after midday. These films give a much better chance of avoiding under exposure and they will stand a good deal of over exposure, as they usually have a double coating of emulsion, and so give more latitude.

On dull days and for all subjects likely to want more exposure, keep the lens at the largest opening.

Orthochromatic and *Panchromatic* films and plates are specially sensitive to the colours which do not generally photograph well. They are not used for taking photographs in colour, but they give a correct rendering of colour in black and white prints. *Orthochromatic* plates are sensitive to yellow and green. A flat yellow screen (called a filter) is often used to obtain the full colour correction, as for instance, in photographing a mass of bright yellow flowers, which on an ordinary film come out almost as dark as the green leaves. By using an *Orthochromatic* film and a filter, the flowers appear almost white, as they do to our eyes. *Panchromatic* plates and films are the fastest. They are specially sensitive to yellow and red, so that they hardly need

to be used with a filter. They are largely used for taking photographs by artificial light, in interiors of buildings, for subjects such as flower gardens, as well as for high speed work.

Buildings.—Many would-be picture-makers have the fixed impression that certain buildings are more picturesque and will make better pictures than others. This is not necessarily true. The pictorial interest of buildings lies in the way in which the amateur succeeds in making a balanced pattern with well arranged lines and nicely distributed lights and darks. For instance, directly buildings are mentioned in connection with photography our minds go at once to thatched cottages and tumble-down ruins. These things, relics of past times, have a sentimental value and we imagine that they will necessarily make good pictures. But our cameras can be used to greater advantage in recording the things and events and happenings of our own time. The life and movement around us, in the town as much as in the country, offer all the material needed for making pictures. It is in this direction that one can exercise individual choice and judgment. The picturesque objects are photographed so much that they become commonplace and ordinary. Of course we make pictures of old houses, thatched cottages and old-world street scenes, but not because of their sentimental interest, but only if they compose well and have a real pictorial appeal.

One of the chief difficulties to be met with in photographing buildings is the lowness of viewpoint. Even with the view of a cottage, the camera is only about three feet above the ground level, while the roof may be twenty-five to thirty feet above that. The view-finders that you look down into, give a lower viewpoint than those with metal frames, but in either case the view shows very little of the road and there is difficulty in including the house tops. As the camera must be kept perfectly level to get all the upright lines parallel, one usually

finds it difficult to make an agreeable composition. When taking a landscape view, the front of the camera is often tipped upwards, so that the trees come near the top of the picture. If this is done when taking buildings, the upright lines will lean in towards the top centre of the picture. Unless one deliberately intends to take "angle views" the camera must be kept level. At one time every camera had spirit levels on it so that it could be adjusted exactly horizontal in both directions before making the exposure. But angle snaps and unusual views have altered our ideas on these matters.

Partly to overcome the difficulty of the low viewpoint, advantage should be taken of every rise in the ground in order to get up higher. Streets that run downhill are better taken looking down than up. One can often find a wall or fence or some such vantage point, for if the camera is only a foot or two higher up, it makes all the difference to the picture.

No. 1 (Plate XXVIII). It is highly dangerous in these times to attempt to take views from the middle of the road, even in country districts; and it seldom gives any view worth an exposure. In towns one cannot safely step off the curb to take a snapshot. The sketch shows how impossible from a pictorial point of view such a scene becomes, for all the main lines run towards the centre of the picture. The view is divided into four symmetrical triangles and consequently lacks variety and interest.

No. 2. In most suburban streets the view is little better than is shown in the sketch, where the vanishing point of the lines is placed farther from the centre. This picture gives a congestion of incident on the left-hand side and monotonous long lines on the right. Unless there is a spire, or tower, or tall trees to relieve these uninteresting lines, it is not worth taking.

No. 3. In most of the old-world towns and villages and wherever there are groups of old buildings, a great deal of the pictorial interest lies in the outline shape or silhouette, and consequently the pattern of roofs, with hips

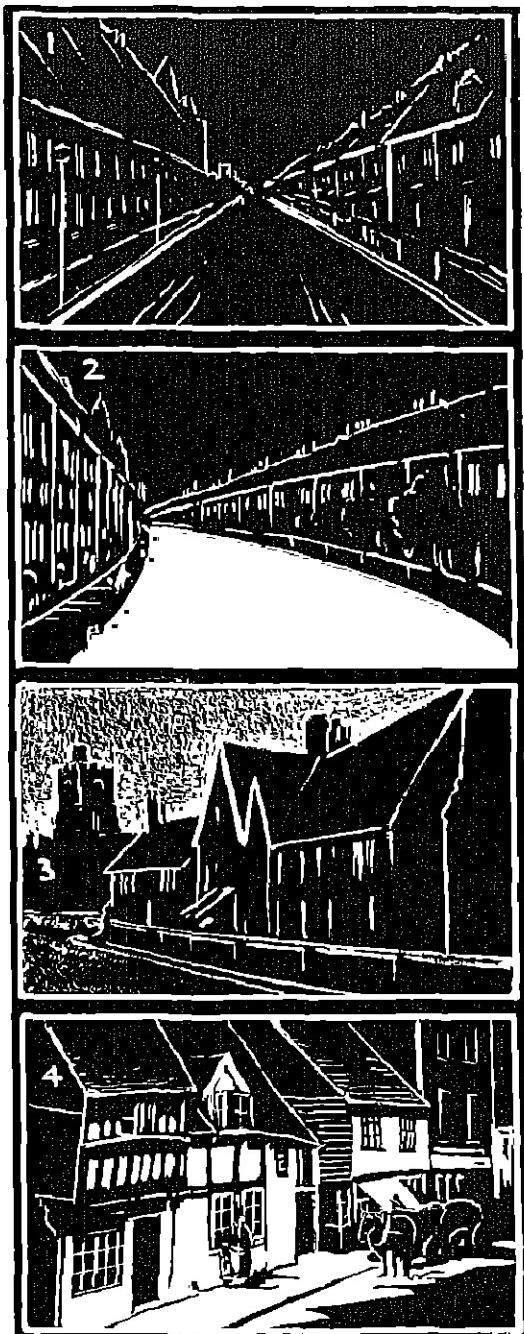


PLATE XXVIII. STREET SCENES



PLATE XXIX. UPRIGHT COMPOSITIONS

and valleys and gables, may play a large part in the picture. In the sketch note how the square of the church tower gives variety by contrasting with the triangular shapes of the roofs.

No. 4. It sometimes happens that an interesting row of shops and houses has the roofs on about the same level. In that case the interest lies below, and the roof tops can be cut off, as shown in the sketch. This concentrates the attention on the road and the shop fronts. One should endeavour to get shadows across part of the road, in order to balance the roofs which are sure to come fairly dark in tone. Notice the value of the white dormer window in carrying the light into the upper part of the picture.

No. 5 (Plate XXIX). Here the camera has been turned to give an upright view. However pictorial the cottages are, it is an unsatisfactory composition, being altogether too symmetrical in spacing, while one side of the picture is some fifty yards nearer to the camera than the other. The dotted diagonal lines show how the main lines lead to the edge of the picture instead of near the centre. There is no balance and with a light sky and road the whole weight of dark mass is on the right-hand side.

No. 6 and No. 7. If by making the vertical lines slope, one gives a greater sense of looking upward, then the camera should be tilted. But nothing is worse than a thing which leaves one in a state of doubt as to what was the intention. It should be either upright or definitely sloping. There is no need to exaggerate the slope, but there should be sufficient to let it be seen that the slope is intentional. The most important thing is to make sure that the buildings have *stability* and are not falling over to either side, hence the vertical lines nearer the centre of the picture should be perpendicular. In the sketches the vertical lines which form the back bone to each pyramidal mass are the longest uprights from the base to the peak of the tallest tower. By comparing No. 6 and No. 7 it will be seen that the outline shapes of the building are very little

altered although one has vertical and the other sloping lines. If these modern skyscraper buildings are properly designed, they usually achieve a pyramidal outline. This pyramid is balanced and soundly based. In most cases (as in this) one cannot see the base or the ground line, as everything depends on the centre line being vertical. This tilting of the camera does enable one to get views that could not be attempted if the camera had to be held level. But wherever it is possible the upright lines should be perpendicular, particularly where there are houses on either side of the picture, or they will appear to lean in, and so give an uncomfortable feeling of instability.

Bridges.—No. 1 (Plate XXX). Bridges are often much easier to photograph than buildings, for usually there are sloping banks which enable one to get at the right height for the view. Generally it is better to take a bridge in perspective rather than facing full on. In perspective means looking at an angle along the bridge and not running across the picture parallel with the bottom edge. The sketch shows the latter view. It is better to include the whole of the end arches than leave them unsupported, as this view shows them. Where there are trees on the river bank from which you are photographing, the usual difficulty is to get sufficient balance on the opposite side, so beware of getting too much weight on the near side.

No. 2. This is a perspective view of a bridge. The diminishing lines lead the eye right into the picture and so give depth, while the proportions of the bridge also diminish and become a ratio. It is a mistake to go too close to the bridge for this produces exaggerated and sudden perspective. The white sail serves to carry the light into that end of the picture and maintain a balance, as well as adding life and movement. Watch all the upright lines to see that the camera is level. This is a most important matter when taking upright structures on or near level water.

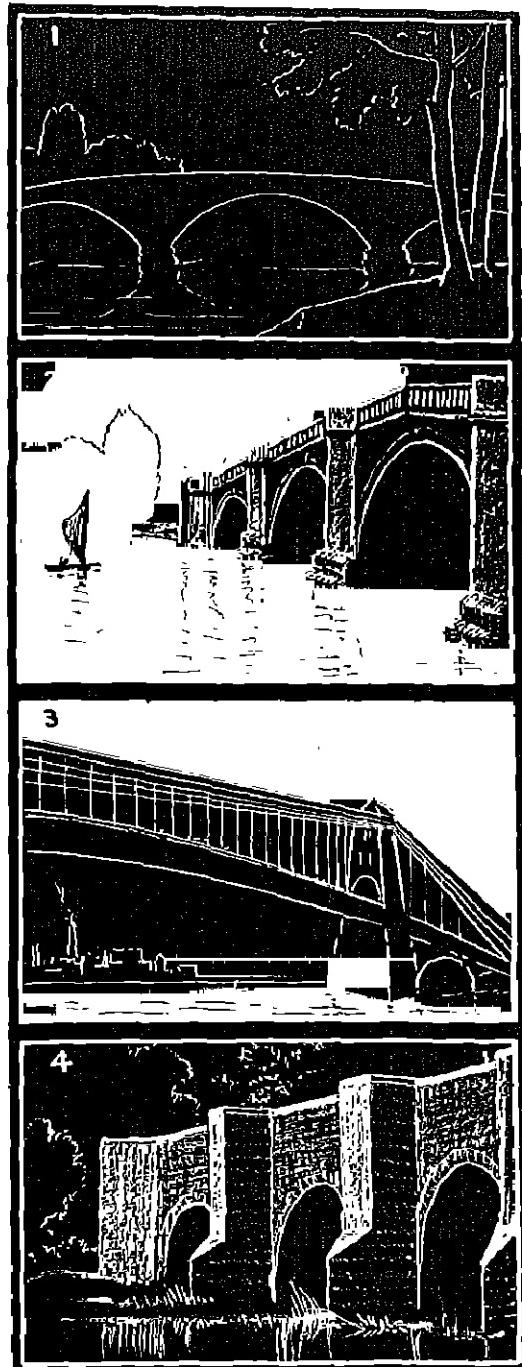


PLATE XXX. PICTURES OF BRIDGES

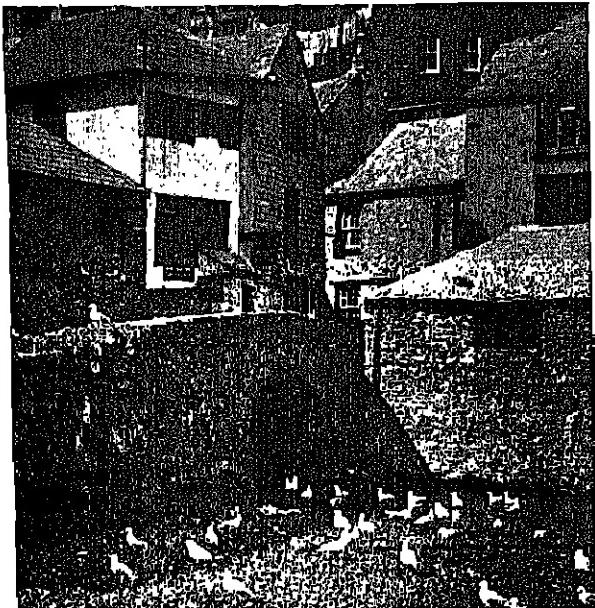


PLATE XXXI. A VIEW LOOKING UP

No. 3. This sketch of a bridge is shown as an example of what to avoid. It does not compose well as the main lines create an unpleasing shape. The nearer end of the suspension bridge is left quite unsupported. At least one should show that a bridge has a firm and solid support. The fault here does not lie in the type of bridge, but in the viewpoint and the way in which the view has been composed. There are several suspension bridges which make excellent pictures.

No. 4. This view is altogether more picturesque. It has a sturdy and solid character, and is in a delightful setting. Reeds growing up the arches show a shallow river with not much rise and fall. It is a gently flowing stream, backed by trees, through which the sunlight plays and dances. The stones of which the bridge is built would be covered with lichens and mosses, adding colour and texture. In composing the picture it is best to forget all this and concentrate

on the pattern it makes. What one has to decide is the placing of those three dark arches with sufficient spaces of dark to balance them. It is the spacing of these darks within the picture space that determines the success or failure of the picture. To achieve something of the solid sturdy character of the bridge, the lighting must be watched. Choose a time when the light is not coming from behind, for then things tend to look flat and evenly illuminated. If the sun is from one side, putting some angles in shadow, then each buttress will appear to be built out, and so give strength and solidity.

Old houses.—Here are two views of old houses (Plates XXXI and XXXII), one a view looking up and the other looking down. The

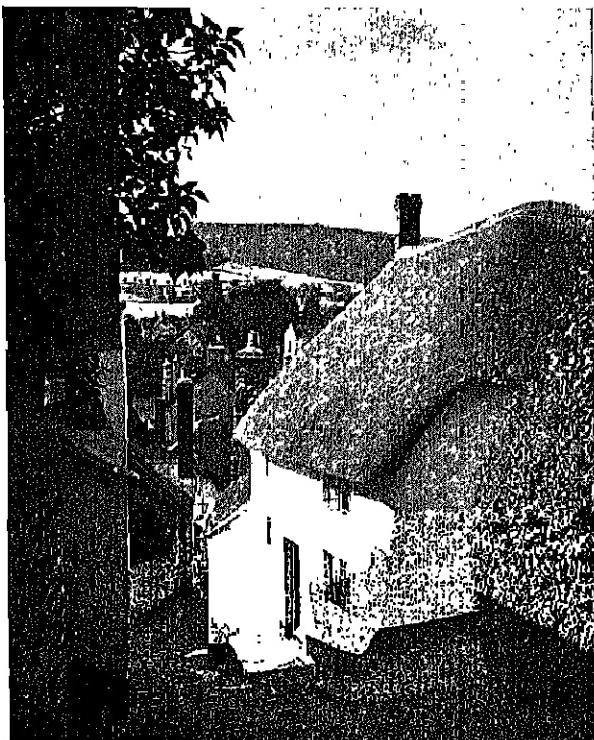


PLATE XXXII. A VIEW LOOKING DOWN

top one with the bridge and the old houses builds up nicely and the lights and darks are well arranged. The gulls spotted over the foreground make an interesting feature, giving life and character to this fishing village. In this kind of view there is no need to include the outline of the roofs. As all the incident is well contained in the picture the roofs are not needed. There is generally a feeling that one wants to get the tops of the houses, but it is not always necessary to do so, and this sort of view allows the camera to be kept level. In both views it is essential to keep the upright lines perpendicular.

The chief interest in the lower picture is the thatched cottage, but everything fits in so conveniently and the view composes so agreeably, that it has definite pictorial qualities. The play of sunlight on the front of the cottage centres the interest and brings light into the lower part. What might have been an awkward straight line of wall on the left is nicely broken by the foliage, and this in turn is balanced by the shadow in the opposite corner. The chimney adds a spot of dark which separates the roof from the distant hill and comes in exactly the right place. In fact, this small chimney forms an excellent example of the way in which an accent rightly placed will constitute a balance to much larger and heavier dark masses. By putting a small piece of paper over the chimney one can see what a difference it makes to the picture.

When photographing street scenes there must be a good light, and unless *Extra Rapid* films are used they are likely to be under exposed. Of course streets vary considerably from the busy thoroughfare of a town to a narrow country lane with a few cottages. It is in such subjects as the latter that some difficulty may be found in estimating the amount of light.

Street scenes particularly need some evidence of life and action, or they look dull and empty, but it is well to see that figures are kept small and few in number. Only enough are needed to suggest that the place is not

deserted; if they are too near the camera they will be out of focus and probably show movement. The picture-maker should first compare the view and then wait patiently until the figures arrive at about the right position.

The infinite variety of old houses in size, structure, shape and colour are qualities that are bound to attract, but it is a mistake to try to crowd them all into one picture. A street may provide a dozen snapshots—a doorway or a window, a well-timbered house, interesting roofs or chimneys—each well worth a separate exposure. As the lighting gives such different effects, do not be content with a passing visit, but go back two or three times at different periods of the day in order to compare these effects. Use the camera more in the way an artist or an architect uses a sketch book, to record the things and parts of things that interest him. Anyone can take the ordinary view of a place, and in most cases one can buy post-cards of them, but snapshots should be a personal record.

It is generally difficult to get a good view of a cathedral, for in most cases it is obscured by the surrounding buildings. There are not many places from which one could secure such a splendid view as this of Lincoln Cathedral from the castle, Plate XXXIII. This is about as open a view of buildings as one is likely to find. In this subject there are no near objects, the dark parts are all small, and for exposure it would rank practically as "open landscape." It is a view which covers a large area of space, so there must be more light in it than in any nearer view occupying less space, and so it needs less exposure. On a good bright day an instantaneous exposure, $\frac{1}{25}$ th of a second at F 16 would be sufficient. If the camera is loaded with *Extra Rapid* films there is another way to alter the exposure and also get a sky into the print. Use a light yellow isochromatic filter which fits on to the front of the lens. As this needs about double the exposure, it compensates for using *Extra Rapid* films.

Portraiture.—One of the first things an amateur photographer tries to do is to take a portrait of a friend or some member of the family. Knowing that portraiture needs a good light, a chair is arranged in bright sunlight in the garden. The victim is seated usually with the sun shining full on his face. There is much fussing with the view-finder in order to take in the whole figure and at

cut off by the edge of the picture. It is likely, too, that the objects in the background are sharper and more clearly defined than the sitter!

These are the mistakes we all make, yet they can be easily avoided.

A good light is essential, but it is not necessary to put the sitter actually in sunlight, for a portrait taken in the shade on a bright day can be quite satisfactory. In any case, the light should come from one side and not be directly facing the person photographed. So that is the first point—*never have the sitter facing the sun*. Also, it will not do for the camera to face the sun or the film will be hopelessly fogged. Even when the sun shines on the camera from one side, care must be taken that no rays fall on the edges of the lens. Things seen against the light are often pictorial and interesting, but when attempting to take a picture in this way the direct rays of light have to be carefully screened from the lens.

No. 1 (Plate XXXIV). Here the head of the girl is placed exactly in the middle of the plate. Taken like this it is necessary to trim the print to the dotted line of the sketch.

No. 2. The picture seen in the view-finder is slightly different from that produced on the film when photographing near objects. The centre of the view-finder lens is some three inches above the centre of the camera lens, and allowance must be made for that difference. If the picture were composed in the view-finder as in sketch No. 2, the girl's head would come up against the top edge of the film or even be partly cut off. A little space must be left at the top of the view-finder when taking near objects.

No. 3. This sketch shows a common fault of getting the hands too large because they are nearer to the camera than the face and

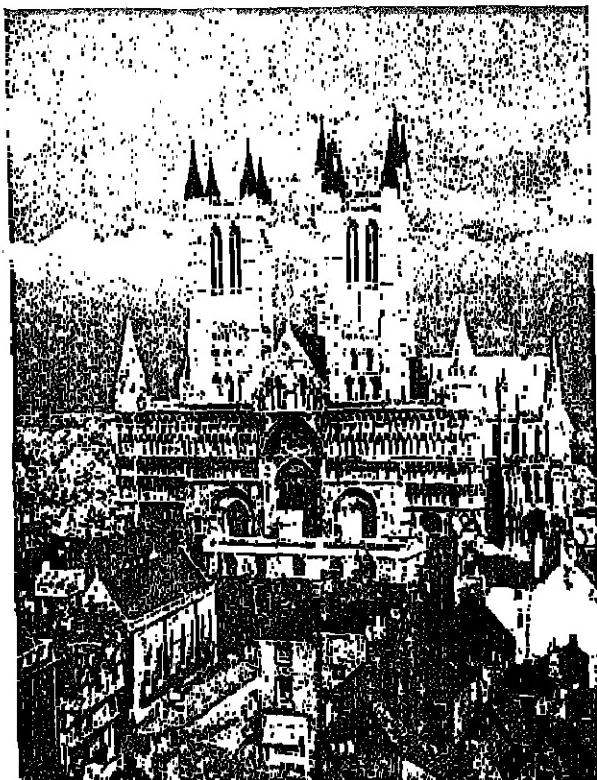


PLATE XXXIII. LINCOLN CATHEDRAL FROM THE CASTLE

the same time avoid including all sorts of things in the background which obtrude into the picture. After much manœuvring, the shutter goes click, and there is urgent haste to get the film developed and printed.

The resulting prints usually show an uncomfortable person trying to look pleasant. The lighting is harsh and the sitter has screwed up his face; his attitude is stiff and lifeless, and probably the top of the head is

body. All parts or objects should be kept as nearly as possible to the same vertical plane. If the hands are placed as drawn, the sitter should turn sideways to the camera.

A good deal of the success of a portrait lies in knowing how much to include. If the interest is in the features or expression, then a fairly large head would be best. If the sitter's attitude looks natural, try to find a point of view from which it composes agreeably with all parts in the same vertical plane, and take a three-quarter or half-length view. If the figure or the dress is important, a full-length portrait may be needed. The essential thing in each case is that the pose should not look stiff or arranged, but be natural and alive.

When taking snapshots the formality of the ordinary studio portrait should be avoided. They can and should be free and unconventional so long as they convey some of the life and vitality of the sitter.

No. 4 (Plate XXXV). It is generally advisable to put the sitter against a simple and unobtrusive background, rather than one which has a marked pattern. That avoids conflict between the two parts of the picture—the person and the setting. An old stone wall, irregular in pattern and with variety of texture, might be all right; but with a newly-pointed brick wall, one is sure to be more conscious of the bricks than of the person.

No. 5. Many portraits are taken in a garden and have foliage as a background. This sketch shows a common result. There is the disturbing flicker of light on leaves and branches radiating from the head. It is not advisable to put the sitter near trees or bushes. Choose a more distant part that is in shadow to come behind the figure. As this is not likely to be uniformly flat and dark, one can usually move the camera slightly until the background shows dark against the light side of the face and figure, and sufficiently lighter against the shadow side to bring it into relief, as in No. 6.

Keep the sitter well away from trees and bushes, and avoid backgrounds with bright



PLATE XXXIV. PLACING THE FIGURE WITHIN THE PICTURE SPACE



PLATE XXXV. BACKGROUNDS TO
A PORTRAIT

spots of light showing through, or the glitter of sunshine on foliage. A tall hedge can often be used as a background, especially when it is in shadow. If there is no suitable background it is a good plan to suspend a blanket—a dark coloured one if possible—behind the sitter. If the blanket has stripes, care must be taken that they do not come into the picture.

Look round the garden to see what accessories can be introduced into the photograph. A grassy slope or a rustic seat is often better than an ordinary chair and usually results in a less conventional pose. A sundial, the margin of a lily pond, a verandah or a balcony, may provide a setting for a full-length figure, which by itself would be isolated. It is worth while to pay attention to backgrounds, for many excellent subjects are ruined by their setting.

No. 7 (Plate XXXVI). The trouble with a good deal of outdoor work is that there is too much top light. Even when the subject is not in direct sunlight there are heavy shadows under strongly marked features. If you wish to make use of sunlight, see that the light comes from one side and slightly in front of the subject. An excellent place for taking a portrait is under a tall tree, provided that the branches do not come down too low. Another plan is to suspend in canopy fashion a sheet. Fix four clothes props in the ground to cover an oblong equal in size to the sheet and temporarily fasten with string the corners of the sheet to the tops of the poles. When taking portraits always give a full exposure in order to avoid harshness in the shadows.

No. 8. A hat or a cap leaves the upper part of the face in deep shadow which shows no details of the eyes. As the eyes are, perhaps, the most important part of a portrait, this must be avoided. A full exposure will greatly help, provided that the figure is not in too bright light. Much can be done to illuminate these dark shadows by using a reflector of the simplest kind. One or two sheets of newspaper or a table cloth hung on a clothes horse can be effectively used

to lighten the shadows on one side of the face. Newspapers or a table cloth can also be spread over a box or stool and the reflected light directed upwards from near the ground to the shadows of the face. Where a face is strongly lighted from one side, the contrasts are likely to be harsh; a reflector will soften this by lighting up the shadow side, as shown in No. 9.

Most box cameras have a fixed focus lens. In these, the lens is placed in such a position, that it is sharply focused on the nearest point to the camera that allows distant objects to remain still approximately sharp. In a landscape, all objects in the middle distance are sharp and clear, and near objects will be sufficiently clear, provided they are not too near. With small box cameras everything beyond 8 ft. will be sharp.

For most portrait work it is necessary to be nearer to the subject than 8 ft., and as the lens is fixed, the alteration is effected by adding a small lens which fits like a cap on the front of the camera lens. This is called a *portrait attachment* though it can be used not only for portraits, but for any objects nearer than 8 ft.

A focusing camera has a scale with the distances marked on it and the lens front is moved along the scale to the correct distance, so that a portrait attachment is not needed. With either form of camera it is essential to be able to judge distances. One should be able to estimate any distance up to 24 feet—8 yards. At first the distances should be measured with the feet by placing one foot in front of the other, heel to toe, along a measured line. Or, one can take ordinary walking strides to see how many paces it takes for 6, 9, 12 to 24 feet.

The eye should be trained to estimate distances correctly. Guessing is not enough, check the distances estimated, for with fixed focus cameras a mistake of a foot can utterly spoil a portrait.

Portrait attachments vary and should be suited to the camera lens. By their use one can take objects as near as 3 feet from the camera. They are inexpensive.



PLATE XXXVI. LIGHTING

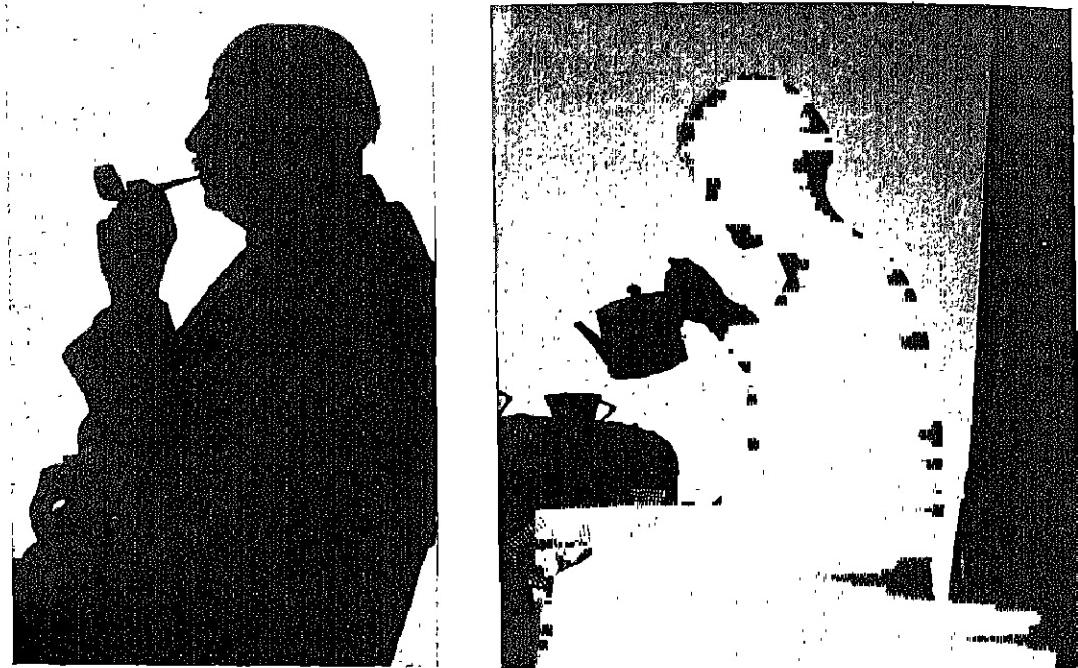


PLATE XXXVII. TWO SILHOUETTES

The next two illustrations (Plate XXXVII) are silhouettes. A silhouette is usually recognised at once as a portrait, although it is merely a flat shape, without features or details. It is really a highly simplified portrait. This should convince one that details of features and expression are not absolutely necessary and that the figure and attitude play a large part in recognition. Many people look at a portrait and judge it entirely by the face and expression, but snapshots can be pictures as well as portraits, and if the features are subdued the picture produced may be the more pleasing.

Plate XXXVIII. Here is an excellent holiday picture in which we see how well everything has been considered. There is only sky for background, against which the shadows tell as simple broad masses. The small amount of light on the face intensifies the expression. The whole attitude and arrangement are natural and well placed. The photographer noted a good subject and knew how to make the most of it.

Plate XXXIX. Here again in "Washing Day" the snap becomes something more than a portrait, and tells its simple story in the right pictorial manner. The few articles included express washing day convincingly, and it all looks perfectly natural. And, of even more importance, it makes a well balanced pattern of light and dark, with just enough smaller pattern to relieve and enliven some spaces.

Glancing again over these plates, note that in each one the person photographed is doing something. That is half the secret of good portrait snapshot work. Give the sitter something to do—something in which he or she is interested that will keep him occupied for the few minutes needed to take the snap. A book or a paper is hardly enough, for it is wise to avoid a pose where the head is turned down and the face not clearly seen. A subject looking towards you should look at the camera, for if he looks at you, he will be looking up in the photograph, for you are well above the camera.

A shrimp net adds considerably to a subject without making the picture less as a portrait. There are a host of articles of this kind which can be used, and there are many domestic activities like "Washing Day" in which children can be engaged. All portraits should not be taken as figure studies, but it is far better that the subjects should be active and doing something, rather than looking stiff and posed.

Children are naturally graceful in their actions and will pose themselves far better than one can arrange them. Get them into an appropriate setting and occupied in some game or story—watch all the time, with the camera ready at hand. It needs an infinity of patience, but the results are worth any amount of time and bother. In any case, avoid fussiness and do not try to order or hurry things. Their simple homely cos-

tumes in light colours photograph well and enable you to give snapshot exposures.

It is important to remember that with portrait work the subjects are nearer the camera and need longer exposures than landscapes. The essential thing is to see that there is a good light. One cannot attempt snapshot portraits with a cheap camera on a very dull day, but on normal days much can be done with really fast films. On bright, sunny days, with the usual rapid films, an instantaneous exposure at the largest stop is sufficient. At the seaside, working in sunshine, F 16 will be large enough. On cloudy and overcast days, use Extra Rapid films and F 11; particularly if the subject wears dark clothes or the background is a heavy one.

Portraits can be taken indoors in daylight with the cheapest camera, provided that the subject can remain steady for three or four



[Photo: Kodak Snapshot.]

PLATE XXXVIII. A HOLIDAY PICTURE



[Photo : Kodak Snapshot.]

PLATE XXXIX. WASHING DAY



[Photo: Kodak Snapshot.]

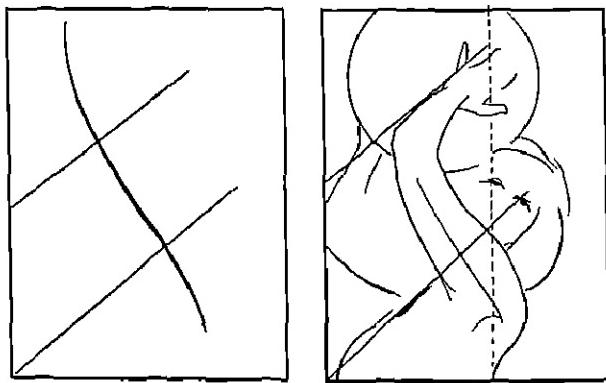
PLATE XL. AN ENERGETIC AND VIGOROUS PICTURE

seconds. The sitter should be placed on a stool or covered box about two feet from the highest window in the room. It is better to use a stool or box than a chair so that the sitter can easily turn away the arms, legs, feet, etc., from the camera and so prevent these parts from being out of focus, or unduly large. The stool should be placed a little to the back wall at right angles to the window, so that the main light falls to the side-front of the sitter. It will immediately be seen that the one side is brightly and harshly lighted and the other side in deep shadow. To remedy the one, fix with drawing pins a piece of coarse white muslin over the window. At once the light will be diffused and the face looks modelled. To remedy the other, hang a table cloth over a clothes horse and bring it as near to the side and side-front of the sitter as is necessary to lessen the shadow intensity. Do not bring the table cloth too near; there must be a slight difference in depth of shadow on the two sides of the face or the portrait will be very flat. There is no trouble with the top light in an ordinary room. With the sun shining on the window side, but not directly on the subject, between the hours of eleven and two (except in the winter months) an exposure of 4 seconds at F 11 will be sufficient if fast plates or films are used. Of course, the camera cannot be held steadily for this time exposure; it must be fixed to a tripod or stood on a stool or a high chair, or on the edge of a table, etc. As it is very difficult to see clearly in the focusing mirror inside a room, the distance of the camera from the sitter should be accurately measured, and a portrait attachment must be used as noted above. The camera lens should be in a direct horizontal line with the middle part of the amount of the subject that is to be included in the picture. It is well in the first experiments to measure necessary distances in the room with a tape measure or a bamboo rod or other long stick marked in feet.

Figure study.—Plate XL is an excellent example of figure study. A portrait is essentially a study of character. A figure study is not concerned with character, but with life and activity. In this picture the vitality and action are reminiscent of the pleasures of a seaside holiday—bathing, romping, blue skies, fresh air and warm sea breezes. As these are things that we all enjoy and desire, the subject of the photograph has a universal appeal. The success of this picture depended on the right use of a few fundamental lines and shapes.

Pictures of this kind are not merely the result of lucky accidents. They are usually the result of much thought and experiment, and they invariably show a knowledge of the essential business of composing a picture. The *lines* of a picture are not always recognised. They are directional tendencies, rather than definite lines.

Just as we do not see the steel girders in a modern concrete building, so we may not be able to see the structural lines in a picture. In the accompanying diagrams, the first shows the main directional lines which suggest movement and vitality. The two sloping lines are the principals, and their direction is upward, leading the eye right to the top of the picture, so that the hand and the ball become the chief features of the picture. The curved line of the arm is a counter to these main lines. It is the supporting factor, and coming in front of the



DIRECTIONAL LINES



PLATE XLI. THE PAVEMENT ARTIST
This photograph was taken with an Agfa film.

others, it gives a spiral form to the design. The second diagram gives a better idea of the placing and distribution of the main lines. We see that the picture is a successful balance of angles and curves. The dotted line shows how stability has been retained—imagine the head a little farther back or the ball a little farther forward, and the balance would be spoilt.

It is extremely unlikely that the photographer thought about any of these things at all when he made the picture, but he must have posed the figure and adjusted his point of view, until he had achieved out of the experience of taking many hundreds of photographs all the life and vitality and action possible. He watched the pattern in the view-finder and was not content to make the exposure until every part assumed its right place, and the whole picture satisfied his desires.

Plate XLI. Here is a figure study having a principal figure with secondary ones in the background. The pavement artist is appropriate in character and attitude, and the setting is good.

The figures in the background add to the general interest of the picture, for they are all actors in the scenes, being interested in what is written on the pavement. The only figure out of place is the one nearest the centre, for she stops the perspective of the wall and makes a spot of light where none is wanted. By covering her with the finger we can see how the picture gains by the omission. When a good subject of this kind presents itself where several figures are included, it is always best to make three or four exposures at intervals as favourable opportunities arise.

Plate XLII.—This is an extraordinarily happy snap—such a lovely donkey, so alive and alert. The whole group shows a moment of arrested action and sheer enjoyment. The camera has been held low and pointing upward, so as to get the plain blue sky as a background in which there is nothing to interfere with the group. The sunshine and bright light of the seaside have allowed the



{Photo : Kodak Snapshot.
PLATE XLII. "WE THREE"

520 TEACHING IN PRACTICE FOR SENIORS

photographer to stoop down and get the scene sharp and clear. This is a picture in which photography excels; its clearness and detail are things that one can linger over and enjoy. The fur on the donkey's nose is so

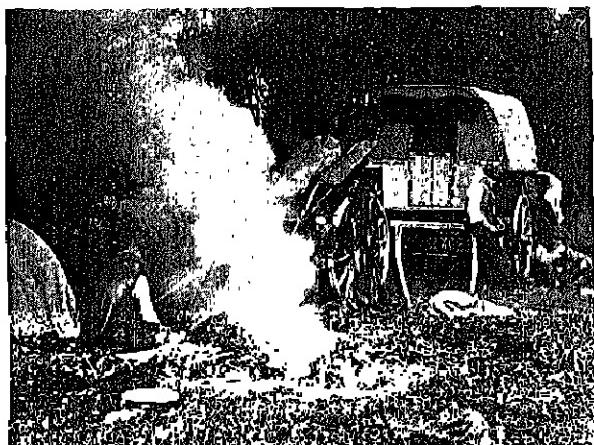


PLATE XLIII. THE GIPSY ENCAMPMENT

soft that one wants to stroke it; the details of the children are equally good.

This and Plate XL suggest life and movement. They do not attempt to show actual motion, but are none the less effective in conveying the idea of movement. We know that the small boy has momentarily reined in the donkey, just as in the other picture the girl's movement to throw the ball is arrested.

With a fixed focus camera the photography of movement is limited. Railway engines and motor cars travelling at full speed, aeroplanes taking off or alighting, people running, jumping, diving, and all such subjects are classed as "high speed" photography. They require special apparatus that is generally elaborate and costly. Although the limitations of a box camera do not allow of much in speed photography, it is possible, as we have shown, to suggest movement and suggestion is often better than realisation.

One obviously cannot take a picture of a motor car racing across the line of view with a shutter that has a speed of $1/25$ th of a second. If the car is approaching or going away from the camera at an oblique angle, its motion across the picture will appear less rapid, so an attempt can be made to photograph such subjects. A photographer directly facing a runner would see in the view-finder that he appeared to become larger and larger as he approached the camera, but there would be little lateral movement. Naturally one would keep out of the runner's path, as one would for any moving object. If there is any movement across the picture, the object should be kept just off the centre of the view, while the camera is swung in line and in time with its travel, the shutter being released while the swing is taking place.

Any action is shown best either at its beginning or at its end. For instance, a person throwing a ball can be taken with the arm right back ready to throw; or when the arm is right forward and the ball just about to leave the hand. There is a distinct pause in the movement at either end of an action, and this is the photographer's opportunity to secure clear pictures.

Plate XLIII.—This is a subject in which the setting is highly important. These gypsies were encamped on a strip of waste land by the side of a country road on an

evening in late summer. There were a cart and caravan, two or three ponies, a small beehive tent, two young men, and an old man whittling sticks and splitting them for making clothes pegs. The fire had just been lighted. It was too early yet for photographs as the picture needed a softer light which would simplify and give the scene more mystery.

For half an hour we talked to the gipsies, watching the effects and studying the view-finder from time to time. The real problem was, how long to leave the exposure. When was the latest possible time when there would be sufficient light to prevent under-exposure with fast films, stop F 11, and 1/25th of a second exposure. As soon as the daylight began to wane we made one or two exposures; and repeated this at intervals, making altogether nearly a dozen snaps while the light lasted. The really exciting effects came later than this when the gipsy women and children returned and were busy round the fire cooking their evening meal. We would have been glad then to possess one of those miniature cameras with a very fast lens, which enables one to secure such wonderful scenes of figures lit up by the fire-light, and the summer evening background. However, those that we secured never fail to recall the picturesque scene—the meeting with strange and unusual people—and a delightful wayside encounter. Snapshots have a personal value to the photographer far beyond their artistic merits or the scenes they record.

No. 1 (Plate XLIX). When taking groups, one can at least avoid the ordinary photographs of groups that include a number of people, where the back row stand on a form, the next row stand on the ground, another row sit on chairs, and the front row sit on the grass. That is one way of getting them all into the view, but it is very monotonous and unsatisfactory.

We should try to make attempts at grouping less formally. If, for instance, you wish to record a country picnic, choose some occasion when the people are gathered

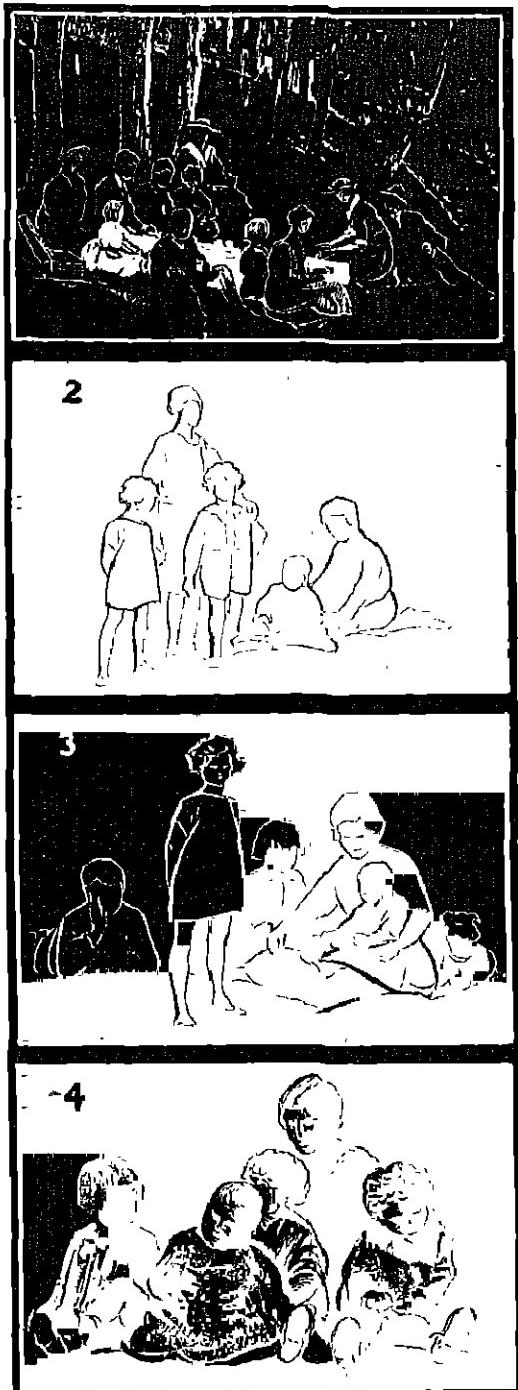


PLATE XLIX. ARRANGEMENT OF GROUPS

together for lunch or tea. The slope of a hillside makes an agreeable background for the setting, and allow for the group to be spread in an upward direction as well as across the picture. Also, it may be possible to find some slight rise on which to place the camera and give a higher view point. The position of the white table cloth is important. On no account should it be in the middle of the picture, and only parts of it should show. After that it is largely a matter of distributing the light spots such as dresses, hats, collars and light shining on or through trees. Look at the scene in the view-finder as a pattern of light spots on a dark ground. Of course, one must also look over the group itself, to see that one figure does not obscure another, and that all the sitters can be clearly seen. One or two back views, or three-quarter back views of figures will make the group appear less formally arranged. It is obviously best to put the least important persons in these back positions. Make the whole group generally triangular in shape so as to give a firm base and an apex to the scene. Have the figures turned so that the interest is kept within the picture but at the same time let some outside figures join the whole to the margins, or there will be unpleasant blank spaces to look at.

No. 2. This sketch deals with the relative proportions of a family group of five people, including mother and baby. It will be obvious that if mother stands, the whole group is made much smaller as the camera has to be placed farther back to include the figure.

No. 3. If one of the children stands up, it allows the figures to be larger, and they also fill the picture space more comfortably. This arrangement gives the standing figure too much importance.

No. 4. In this sketch all are seated with mother at the back and baby slightly in front. The figures are now as large as possible, but it is necessary to keep baby from getting too far forward, and for mother to lean in towards him, so that they all are in the same vertical plane.

The essence of composing a group is to make it as compact as possible without crowding the figures. Avoid regularity and uniformity. Let them pose themselves as far as possible. Do not be in a hurry, or fuss about things. Very often it is an advantage for the photographer to stand on a box or a chair when taking a group; otherwise the point of view may be too low. Where the photographer is concerned with groups as *portraits*, it is essential that each member is shown in a natural and characteristic attitude. At the moment before exposure, no person must be obscured by a movement of one of the other figures.

More figure studies.—In the last talk we were largely concerned with the portrait side of groups of figures; here our attention is centred on what the people are doing. The interest changes from character to occupation. In order to make the most of our subjects, we should know their essential features and aims. Many snapshots fail for want of definite direction. It is not, of course, possible or necessary to keep strictly to the subject, and rigorously exclude everything that does not fit in and help to express it.

In the following plates, note how completely each subject has been conveyed. In no case is there anything out of character, superfluous, or likely to distract the attention from the essentials of the scene. Selection is something very different from promiscuous snapping. Concentration and a definite aim are the chief factors in producing successful pictorial work.

Plate L. Here is a pleasing and well ordered group in which the donkey plays the leading part. The two women are well posed and the group has a natural and unaffected appearance. The chief feature of the photograph is its soft tone gradations. Although the faces are in shadow, and are only slightly rounded and modelled, they show in right value of tone against the blue sky. This is a subject where the figures



[Photo : Ilford Ltd.]

PLATE L. FRIENDS

This photograph is an example of gradations and correct values. It was taken with a Selsi Hypersensitive Pan film and an Ilford Alpha filter was used.



PLATE LI. HIKERS

[Photo : Kodak Snapshot.



PLATE LII. EXCAVATIONS



PLATE LIII. THE CATTLE MARKET



PLATE LIV. THE DOG SHOW

are shown against practically a plain background.

In the other plates in this chapter, the background plays an important part; in some cases it does more toward expressing the nature of what is going on than do the figures themselves, hence the relative importance of each part—figures, and background—needs consideration.

Plate LI. Here the hikers are of chief importance, but the background not only gives some idea of the country they are passing through, but can make one feel the steady climb over the rolling downs on short springy turf, the warmth of the sun and the downland breeze. Figures silhouetted against a blue sky would have given little of this. The background, having been carefully chosen, adds considerably to, or even makes, this picture. The densely wooded slope serves to show up the hikers' white shirts, while the chalky path carries the light forward.

Plate LII. In this view of excavators at work on the Sussex Downs, the excavations are as important to the scene as the people who are doing the work. The one part would not be complete without the other, and both show signs of activity. In any snapshot of this kind, the viewpoint must first be chosen and a decision made as to how much is to be included. Attention can then be given to the figures. The prominent ones, particularly those in the foreground, should appear to be actively engaged.

There are many subjects of this kind where the camera can secure attractive groups. Most people delight in watching people at work—building, making new roads, manufacturing with all kinds of machines. In fact, a record of our present-day activities affords many opportunities for real pictorial camera studies.

Picture-makers are strangely conservative. Living mostly in towns, they use their cameras only when they go out into the country or to the seaside. Yet in the streets, factories and workshops close at hand are

to be found a whole series of pictures well worth taking.

Plate LIII. A cattle market is one of those country scenes that usually attracts, partly on account of the animals, and partly for the human character to be found there. Here the policeman contributes a humorous note; then there are the agricultural types; the young lambs in pens; the rows of hurdles that help to give that busy appearance to the picture. The photographer found some elevation from which he could look down on the scene, for it would have been far more jumbled if taken from the ordinary level. The high viewpoint tends to separate the objects and characters.

Plate LIV. The dog show is a very busy scene well filled with figures and incident. Although it conveys no feeling of arrangement, it has three main groups. One central—the two little girls with their pets, and the figure behind them; and the two groups, one on either side, which balance nicely and round off the picture at each end, so making a complete composition. So often such snaps appear to be a chance portion from a long strip of people. Note how each of these end groups is a pleasing arrangement in itself, and yet balances and acts as a foil to the other end group. Even if the people and animals are grouped so conveniently as this, it would need a sharp eye to see that there are no awkward poses or obtruding figures, and to choose just the right moment for exposure.

Now that we have looked over our plates, let us look at some of them again from a different angle, and see how we should deal with such subjects when photographing them. There are all kinds of festivals and meetings—pageants, flower shows, sports meetings, and open air shows—where the cameraman can be busy.

These groups containing so many people do not need the super eye of a press photographer to find the pictures. Multiplicity of detail need not worry the amateur who learns to look at things in the right way. Watch the pattern in the view-finder. That

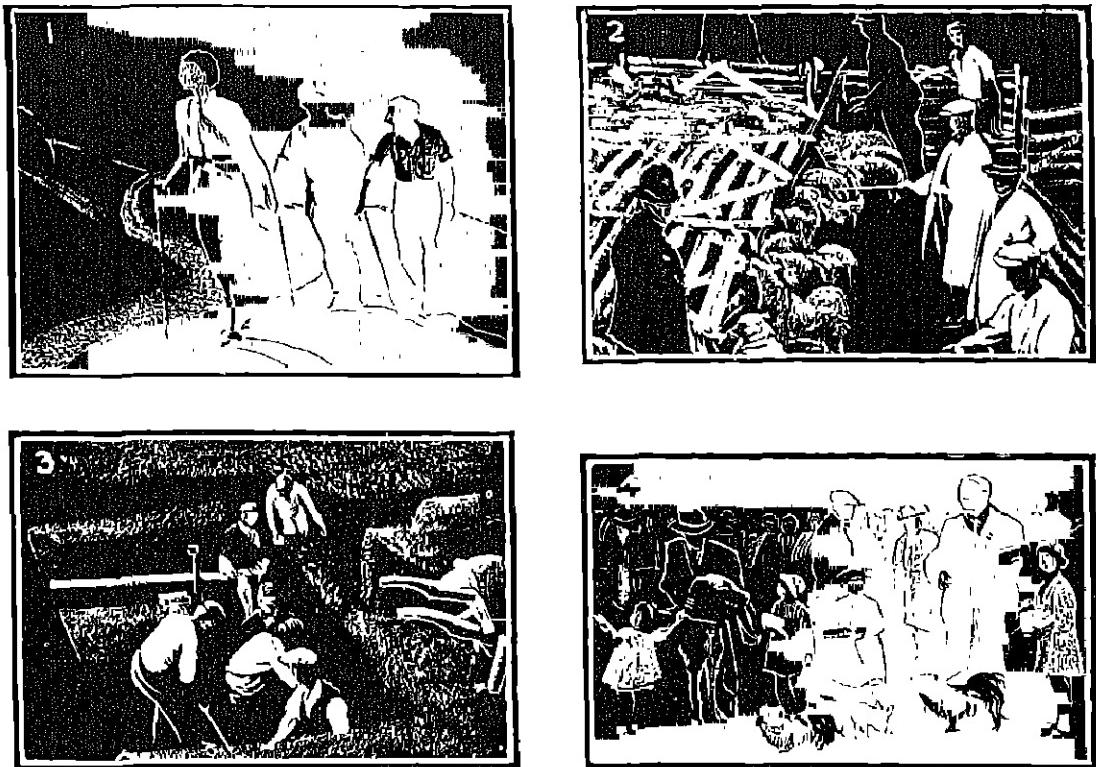


PLATE LV. THE PATTERNS OF THE FOUR PRECEDING PHOTOGRAPHS

still remains the essential way of selecting a view, and is clearly applicable to these intricate groups.

No. 1 (Plate LV). The sketch shows that the really important thing here is the spacing of the two largest spots of light, which are balanced and given forward movement and direction, by the light road which runs out of the lower corner.

No. 2. This is a more equal distribution of masses of black and white. Note how important the policeman becomes. Cover him with a piece of white paper to see how the dark masses tip all the weight toward the top right-hand corner. The composition needed a dark mass in the lower left-hand to balance it. Of course, it need not have been a policeman, but the picture certainly needed a dark figure or object there. Notice

also that the hurdles play a large part in giving a consistent sparkle of pattern all through the picture. Their lines on either side lead in to the picture and give depth and space.

No. 3. Here are the white spots made by the figures and the black shapes of the excavations. As both are necessary parts of the subject, it is essential to judge this as black pattern and white pattern on a grey ground, and to see that they balance. The group of figures falls into a triangular shape slightly tilted and just off the centre of the picture; this is steadied by the wheelbarrow on one side and the long line on the other.

No. 4. We have already noted in this picture the three foreground groups with the long line of spectators as a background.

Seen like this in diagrammatic form, one can realise that it is almost an evenly spotted pattern of small light objects. It is quite extraordinary how regularly these lights are distributed. One easily gets the idea that anything like even spacing should be avoided, but as a matter of fact, it is difficult to accomplish, for one is unlikely to have either equal sized or equally light objects to deal with.

This sketch, Plate LVI, shows the drawings reduced to tiny proportions to show how these scenes would appear in the view-finder. Even on so small a scale, there is no difficulty in seeing the pattern. Each is well balanced and spaced. Note the character of each kind of pattern.



PLATE LVI. WHAT WOULD BE SEEN ON THE VIEW-FINDER WHEN PHOTOGRAPHING THE FOUR PRECEDING SNAP-SHOTS

No. 1 is the simple balance of three light spots; the two white shirts and the light road.

No. 2 is practically a balance of darks against a broken pattern of lights.

No. 3 is a more equal balance of lights and darks.

No. 4 is equal distribution of light spots on a dark ground. These would be seen in the view-finder, not as simple black and white—but in colour and full of half tones. One can, however, soon get into the habit of judging by the pattern—and that is the essence of picture making. There is no need for the amateur to try to analyse or to

classify, or study what kind of pattern he is looking at; what concerns him is, does the pattern appear satisfactory in balance and proportion.

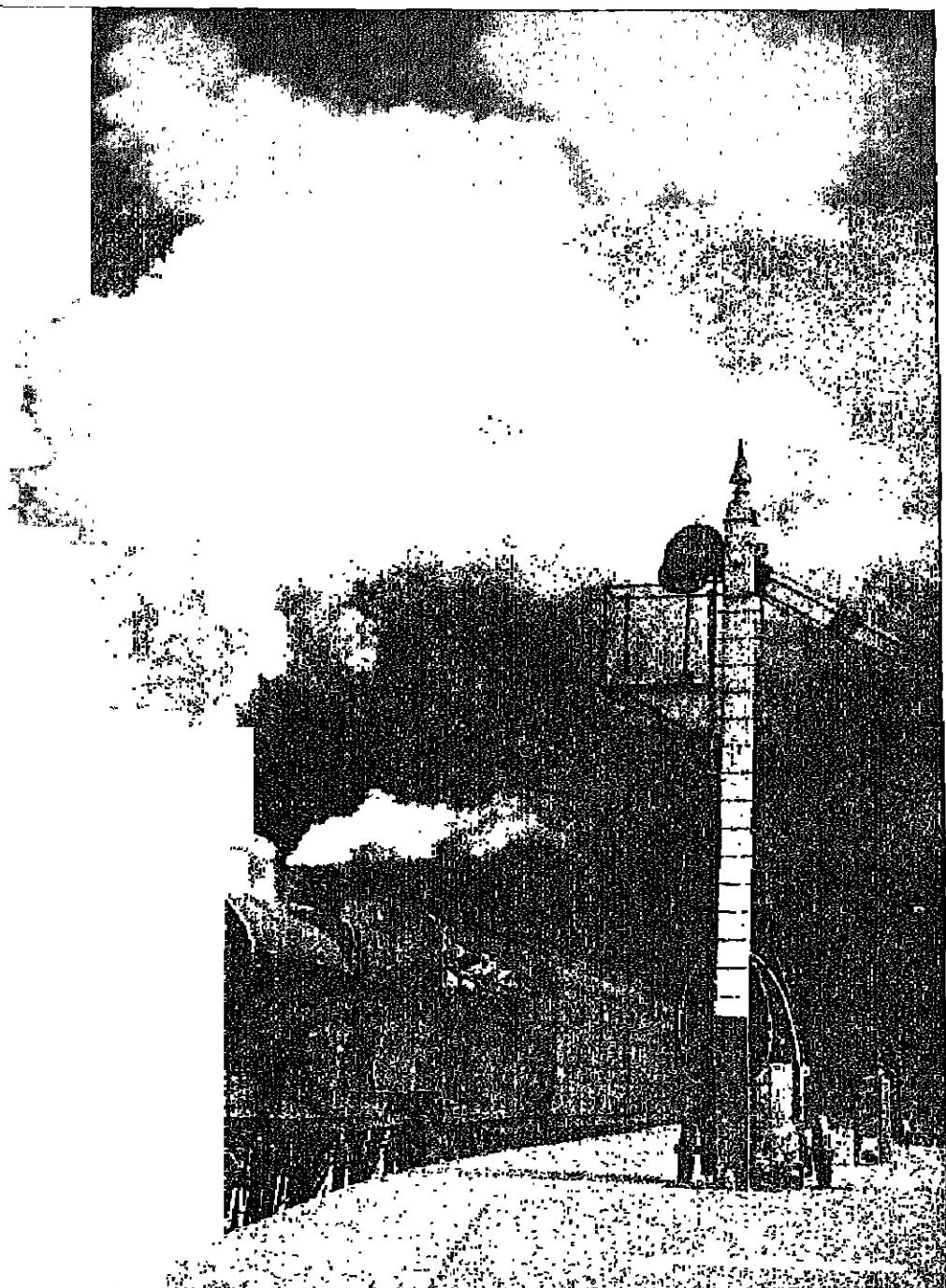
If the colour seen in the view-finder makes the selection of pattern difficult, get a small flat piece of blue glass or blue celluloid, and lay this over the view-finder; the blue neutralises the colours and allows one to see the black and white effect.

Many of the brilliant and ground glass finders show a picture that is less than half the size of the small illustrations; some are even smaller than that, so it is obvious that view-finders as a rule are far too small to enable one to see what is to be included on the film. Consequently, the photographer must cultivate a reasonable "eye" to see with, or he will be groping in the dark, for the tiny view-finder is the only "photographic eye" that he has.

In many respects the metal frame direct view-finder is better than the ground glass or brilliant finder. There is no glitter or reflection to dazzle the image, and the attention is kept continuously on the actual scene so that one does not get alternate glimpses from the finder to nature and back again. The higher position of the camera, too, is an advantage, as it gives a more natural viewpoint. On the other hand, it is not quite so secure and steady a method of holding the camera.

The unusual view.—Under this heading are included such pictures as show old and familiar scenes in a new guise and from a fresh aspect. Novelty is the sauce which whets the appetite and helps one to enjoy a familiar dish.

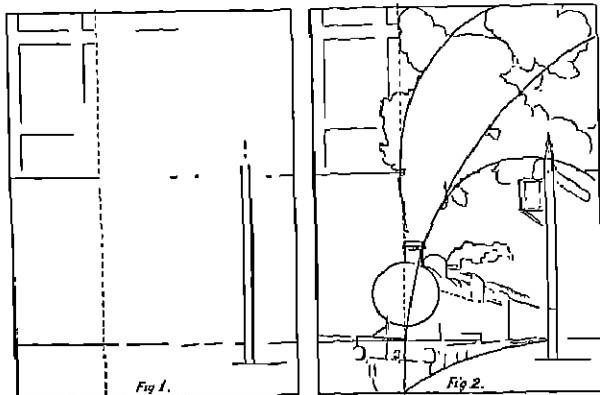
Plate LVII. Here is a splendid example of novelty of view. Few things are more familiar than a train leaving a station; in fact, many of us see this happen almost every day and it has become so ordinary that we have ceased to notice it, either from a pictorial or any other point of view. Yet on seeing this picture we get an immediate thrill. Why does that happen?



[Photo : Kodak Snapshot.]

PLATE LVII. THE TRAIN

This photograph shows an excellent treatment of a familiar scene.



DIRECTIONAL LINES

In this case, it is because of the very completeness of the scene, both from a visual and an aesthetic standpoint. The two small diagrams show the essential directional lines of the print, lines which the eye instinctively follows. *Fig. 1* shows that the setting, the station and the signal are all horizontal and vertical lines which divide the picture into a series of spaces all admirably proportioned.

Against this formal background come three or four curves as shown in *Fig. 2*. These curves radiate from the point where the line of the platform cuts the lower edge of the picture. They are obviously ascending lines which carry the eye across and to the very top of the space. These curves give the maximum contrast to the square shapes of the background; they suggest movement and are in every way expressive of the subject; they take you direct from the mechanical world of to-day up to a whirl of vapour where vision and imagination can begin to function. So the picture becomes something more than a mere snapshot. Part of our enjoyment is aesthetic—from the lines and proportions—and part consists in starting the mind to work and stimulating imagination. Without imagination it will be a picture of a train leaving a

station, but imagination can carry one on pleasant journeys without limit.

Plate LVIII. Here is an unusual view of a cricket match. The game itself is only an incident. It is the queer-shaped opening through which the view is seen that is of most importance. Here again, imagination is stimulated by the contrast of opposite material, and curiosity is piqued by the nature of the building from which we seem to be gazing. The window or aperture with its ornamental iron grill is difficult to place. It is not severe like a prison,

but decorative; it has an old-world air, as though part of a castle. So the mind flits from the cricket match, with the megaphone

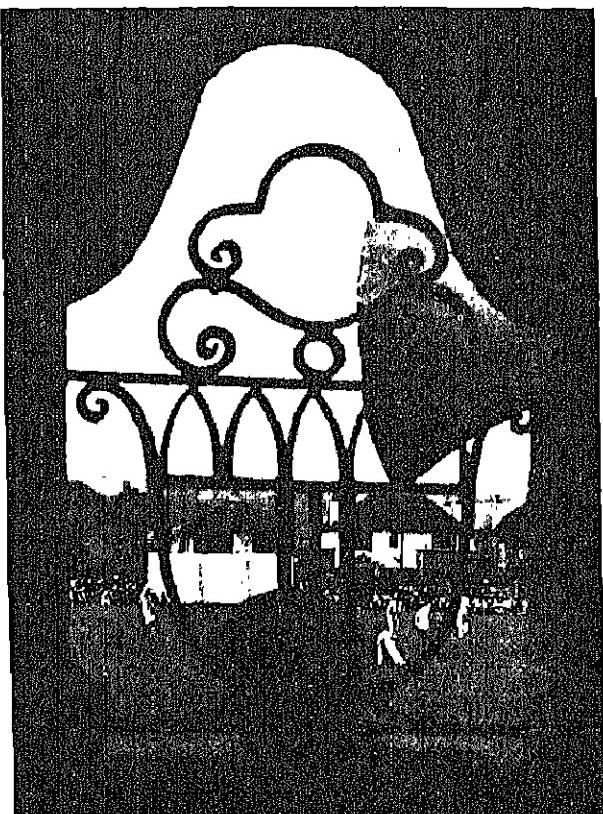


PLATE LVIII. AN UNUSUAL VIEW OF A CRICKET MATCH

and silhouettes of near spectators, to the nature and purpose of the building which allows such a queer view. Any picture that has a stimulating faculty is better than one that is an obvious record, because one can get more pleasure out of it. Also, it adds tremendously to photographic interest if one constantly seeks for new ways and different outlooks on the ordinary every-day scenes. The camera study then becomes individual and out of the ordinary.

In the present search for novelty, the camera is frequently pointed up at or down upon things. For years it was the practice to hold the camera perfectly level and in that way the vision of nature became stereotyped. Now there is a tendency toward the other extreme, and pictures are full of acute angles, unbalanced, and with distorted perspective. There is no need for exaggeration or distortion and there are plenty of legitimate subjects suitable for taking in this way.

Plate LIX. This view of "Trimming Sails" is an excellent example of looking upward. It has stability, which is essential

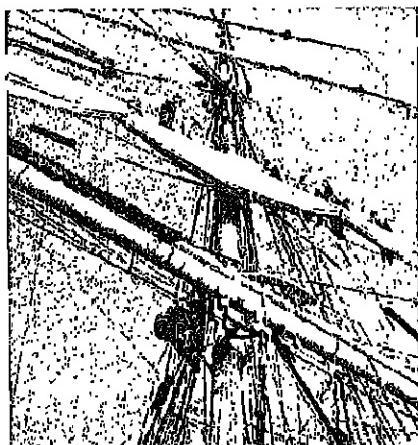


PLATE LIX. TRIMMING SAILS
This photograph was taken with an Agfa film.

in so peaceful a setting. So long as the mast is vertical the spars can be at any angle. If all the lines were sloping and chaotic, it would give a sense of insecurity

to those small figures perched so high above the decks. There is no need to exaggerate that. Those tiny figures aloft are the points of interest which set the scale and give a sense of immensity to a small picture.

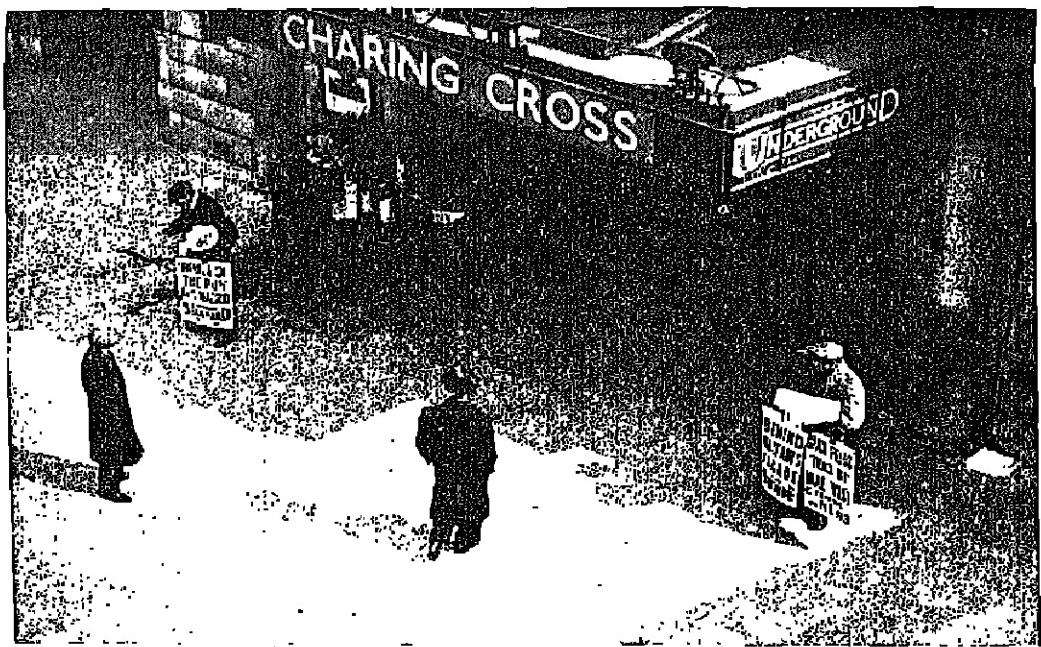
Plate LX, A and B. The two pictures are views of the same subject, but how different in their effect and appeal! The top one is a square direct view in which all the lines are horizontal and vertical. It is an ordinary snapshot of a well-known scene. In the lower picture the central portion only has been included, and we are looking down upon it at an angle which puts the lines on the slope. Instinctively our minds continue the downward passage of our vision and we enter that dark portico to descend still further. So it is evident that while the one picture only mildly interests us, the other really grips the imagination and makes us feel something. In the unusualness of the point of view, and the selection of the right shapes and forms, we have a means of expression well worth exploration. This lies obviously in the general effect of the picture and is not dependent on the details; for there are more figures and more action in the upper view; which should go to show that two or three figures well spaced are more effective than a crowd scattered and in movement,

Nature studies.—Attempts at nature studies usually start with snapshots of pets. That is a very good way to begin, for pets are used to us, and as we know their ways and habits, we can endeavour to secure a picture that shows their essential characteristics.

Plate LXI. This little picture of two kittens not only gives an excellent portrait of each of them, but it conveys their humorous and playful character. Their demeanour says quite plainly that this snapshot business is an interruption of their game and can be merely an interlude. The ball was added to the print as an afterthought to balance the design and give more reason and vitality to the subject. Cover the ball to see how empty that corner becomes without it, and how



A. THE USUAL VIEW



[Photos : Kodak Snapshots

PLATE LX.

B. AN UNUSUAL VIEW

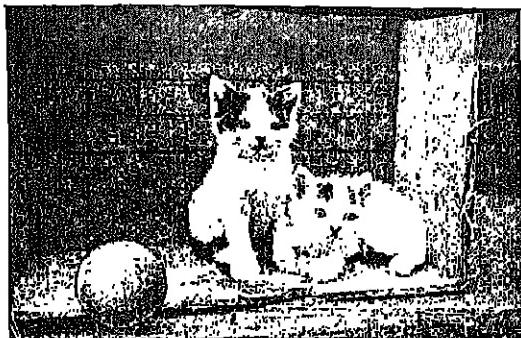


PLATE LXI. KITTENS

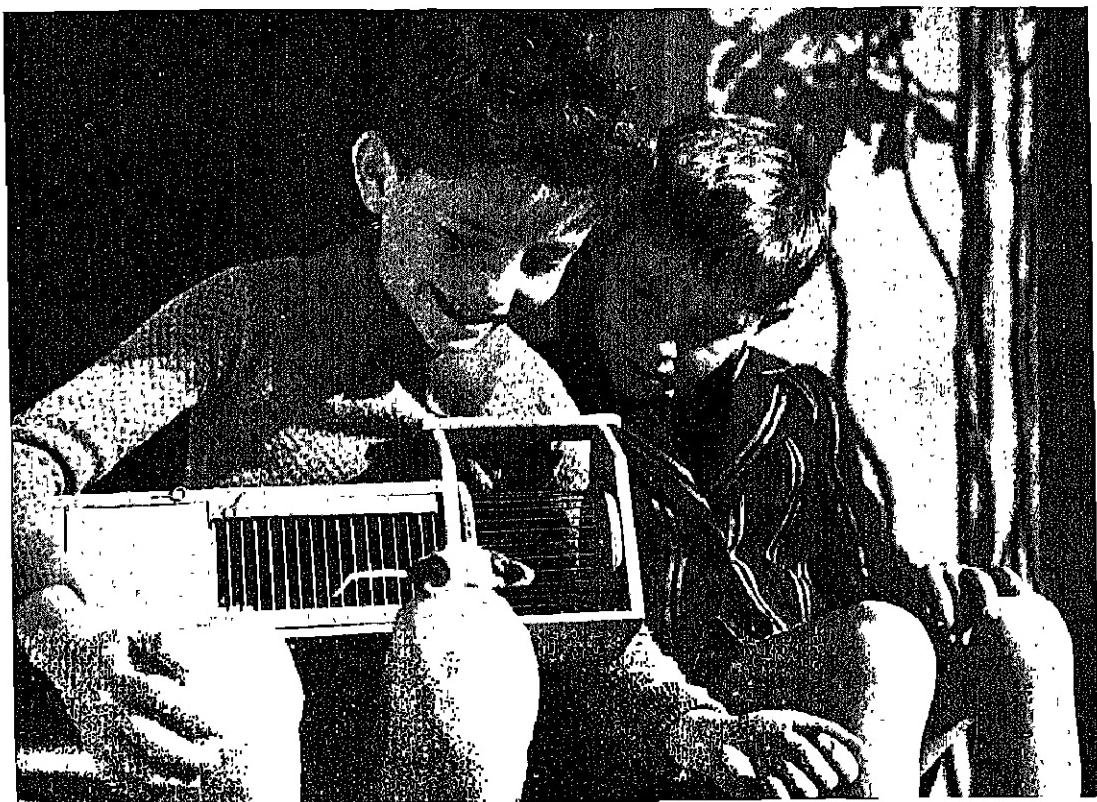
This photograph was taken with an Agfa film.

much more playful the picture becomes with the ball to suggest playfulness.

Plate LXII. This is an excellent figure study which has an added interest by the

inclusion of the tame mouse and its cage. It is often advisable to give sitters something of interest to do when taking portraits. This is an excellent example of the way that it may be done. Here is not only a good portrait of each boy, but also a well composed group in which the interest centres on the mouse.

From photographing pets, one may go farther afield and make use of the camera for making records of birds, animals, wild life, trees, flowers, and so on. One can illustrate and make pictorial records for lessons in botany, entomology, biology or any subject in which one is particularly interested. The pictures can also be used in designs for handicrafts. In fact, there are no limits to the manner in which snapshots can be utilised if care is taken to secure appropriate



[Photo: Kodak Snapshot.]

PLATE LXII. THE WHITE MOUSE



PLATE LXIII. A DESIGN FOR EMBROIDERY OR DECORATION

studies and find the way of extracting the best from them. It is essential to have some direct purpose and keep that in mind all the time. It should be a personal and individual matter to keep to the subjects in which one is interested and to do those as thoroughly as possible.

Snapshot work generally is particularly haphazard and promiscuous. Anything and everything is "snapped." But one can specialise without becoming narrow and by so doing will gain by concentration of effort. If the aim is scientific, it is necessary to secure clear, sharp pictures in which details are clearly shown. If the aim is pictorial, one is more concerned with design, spacing and composition, than with accuracy and detail.

Plate LXIII. A swan with her cygnets is always an attractive subject, just as young animals of every kind are of interest. Swans are elegant creatures but as they can be dangerous when anyone approaches too closely to their young ones, it is well to approach them with care. With animal life of every kind the best opportunity for studies is afforded by zoos and circuses. There is usually no difficulty in getting permission to photograph in these places.

Plate LXIV. "Water Lilies" is such a decorative subject that it can be used with slight adaptation for all sorts of designs such as book covers, head or tail pieces, end papers, advertisements, embroidery, etc. There are scores of such subjects to be found along the banks of rivers and streams and by lakes and ponds. Reeds, grasses, meadow-sweet, willow catkins and other natural features lend themselves for formal artistic treatment. Walks will be full of interest and the camera will be never idle to one concerned with the decorative aspect of the beauties of nature.

No. 1 (Plate LXV). This is a suggestive sketch of a tree and its shadow. It is nothing of a subject. The view is taken simply for its pattern, care being expended on the balance of lights and darks. It is no more than a study and it may give the idea that to take such a picture is merely wasting a film. But if you succeed in making a well-balanced pattern, you will have learned a good deal, and the film will have been usefully expended.

No. 2. Here is a group of spring flowers by the roots of an old tree—primroses, blue-bells, or whatever they may be. It is often useful to take a general view, something like the sketch, and then make one or two separate studies of individual plants or



PLATE LXIV. WATER LILIES

This photograph was taken with an Agfa Ortho Isochrom Superpan film.

groups of flowers. In that way, if the snaps are to be used for handicraft designs, there will be ready at hand the necessary data on which to work. The general view gives the arrangement and composition; the "close-ups" show details of growth and construction.

No. 3. Two young lambs in a corner of an orchard make a pleasing picture. Here again one can follow the same method—although too close a view of the lambs is not required, and an attempt to get one is likely to disturb them.

For handicraft designs it is useful to have two or three separate studies. The important thing is to get a good picture in which the two lambs are well grouped, and this may need using two or three films. The background is not so difficult to manage. One or two separate views from different parts of the orchard can easily be managed.

No. 4. This is a simpler subject to handle as there are only the geese to think about, for the background is very simple. When taking such a picture, avoid getting the geese all in similar positions. For study purposes, the greater the variety of attitude the more useful they are likely to be. Try to snap them when some present a back view and some are facing the camera. See that they look alert and animated.

When taking photographs of this character, it is of importance not to leave the birds in the middle of the picture merely surrounded by a wide margin. The birds must look as if they really belong to and form the picture. Generally, one or more of the birds should touch an edge and there should be some connecting link between the birds and an edge on the opposite side. Leave enough space at the bottom of the picture in order to convey a sense of stability. It will usually be found necessary to trim such photographs a good deal as it is not often that one is so fortunate as to get a perfect picture rightly set in its space.



PLATE XLV. NATURE STUDIES

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(Italicised numbers indicate illustrations with or without text.)

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